Scottish Hydro Electric Power Distribution plc

EPS and Protected Sites and Species Risk Assessment

Outer Hebrides EPS Risk Assessment

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CONTENTS

ABBREVIATIONS

3D	3-Dimensional
AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AUV	Autonomous Underwater Vessel
AWAC	Acoustic Wave and Current
cm	Centimetre
CPT	Cone Penetration Testing
dB	Decibels
dB re 1 µPA	Decibels relative to 1 Micro Pascal
DD	Decimal Degrees
DDM	Degrees and Decimal Minutes
DECC	Department of Energy and Climate Change
DLV	Doppler Velocity Logger
DMS	Degrees Minutes Seconds
DSV	Dive Support Vessel
EC	European Community
EEC	European Economic Community
EPS	European Protected Species
EU	European Union
FCS	Favourable Conservation Status
HF	High Frequency
HRA	Habitats Regulations Appraisal
HWDT	Hebridean Whale and Dolphin Trust
IAMMWG	International-Agency Marine Mammal Working Group
IRM	Inspection Repair and Maintenance
IROPI	Imperative Reason of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
kHz	Kilohertz
km	Kilometres
km^2	Kilometres Squared
LARS	Launch and Recovery System
LF	Low Frequency
LSE	Likely Significant Effect
m	Metres
m^2	Metres Squared
MAG	Magnetometer
MBES	Multi-Beam Echo Sounder
ms	Millisecond
MHWS	Mean High Water Spring

MMO	Marine Mammal Observer
MMPP	Marine Mammal Protection Plan
MPA	Marine Protected Area
MS-LOT	Marine Scotland Licensing Operations Team
MU	Management Unit
NC MPA	Nature Conservation Marine Protected Area
NM	Nautical Miles
NMFS	National Marine Fisheries Service
NMPi	National Marine Plan interactive
NOAA	National Oceanic and Atmospheric Administration
OSPAR	Oslo and Paris Convention
PAM	Passive Acoustic Monitoring
PCPT	Piezocone Penetration Testing
PMF	Priority Marine Features
PSA	Particle Size Analysis
PW	Phocid Carnivores in Water
ROV	Remotely Operated Vehicle
ROTV	Remotely Operated Towed Vehicle
SAC	Special Areas of Conservation
SBES	Single Beam Echosounder
SBP	Sub-Bottom Profiler
SCANS	Small Cetaceans Abundance in the North Sea
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SHEPD	Scottish Hydro Electric Power Distribution plc
SMWWC	Scottish Marine Wildlife Watching Code
SSS	Side Scan Sonar
SNH	Scottish Natural Heritage (now NatureScot)
SPA	Special Protection Area
SPL	Sound Pressure Level
SPL_{rms}	Sound Pressure Level Root Mean Squared
SVP	Sound Velocity Profiler
UAV	Uncrewed Aerial Vehicles
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
USBL	Ultra-Short Baseline
USV	Uncrewed Surface Vehicle
UXO	Unexploded Ordnance
VHF	Very High Frequency
WCA	Wildlife and Countryside Act

1 INTRODUCTION

1.1 Overview

Scottish Hydro Electric Power Distribution plc (SHEPD) hold a licence under the Electricity Act 1989 for the distribution of electricity in the north and west of Scotland, including the islands. It has a statutory duty to provide an economic and efficient system for the distribution of electricity and to ensure that its assets are maintained to ensure a safe, secure and reliable supply to customers. Electricity is now considered to be an essential service for communities, with the cable routes detailed below in Section 1.2 distributing electricity to domestic and business customers, providing a long term economic and social benefit to the communities in the Outer Hebrides. The monitoring of existing assets and survey of new routes relating to submarine power cables therefore constitutes work of overriding public need.

SHEPD has a number of interconnector cables within the Scottish Marine Regions, as set out in The Scottish Marine Regions Order 2015, of which, the Outer Hebrides Marine Region has been considered in this application. In order to ensure a safe, secure and reliable supply of electricity to the Outer Hebrides, SHEPD is planning to undertake geophysical, geotechnical and environmental surveys of their existing assets and over routes for potential new subsea cables.

As such, the proposed survey activities will enable SHEPD to:

- Identify cable location and condition: SHEPD undertake programmed inspections and surveys to understand the condition of the fleet and identify which ones should be taken forward for planned replacement;
- Identify fault locations and carry out repairs;
- Identify any new routes that may be required; and
- Inform cable routing, protection and decommissioning decisions; as well as ensure accurate installation of new cables and their protection during installation.

The survey activities across the Outer Hebrides geographical area are scheduled to be undertaken between 1st October 2023 and 30th September 2028.

1.2 Cable Routes

SHEPD is planning to undertake geophysical and environmental surveys, in addition to the testing and calibration of survey equipment, that may be required for the following cable routes across the Outer Hebrides marine region:

- Claddach Centre
- Claddach East
- Claddach West
- Benbecula – South Uist East
- Benbecula – South Uist West
- Eriskay – Barra 2
- Kisimul Castle
- Laxay – Kershader 2
- North Uist – Benbecula centre
- North Uist – Benbecula East
- North Uist – Benbecula West
- North Uist – Berneray
- South Uist – Eriskay
- South Uist to Barra 1965 (Out of Service)
- Barra – Vatersay
- North Uist to Harris ED2

For the Outer Hebrides Marine Region, there are 16 cable routes to be surveyed contained within 13 cable corridors. For these cable corridors the maximum survey area is 260 km^2 as shown in Figure 1-1.

The co-ordinates for the cable corridors have been provided in Appendix A – Cable corridor coordinates, additionally individual maps of the cable corridors and cable routes are provided in Appendix B.

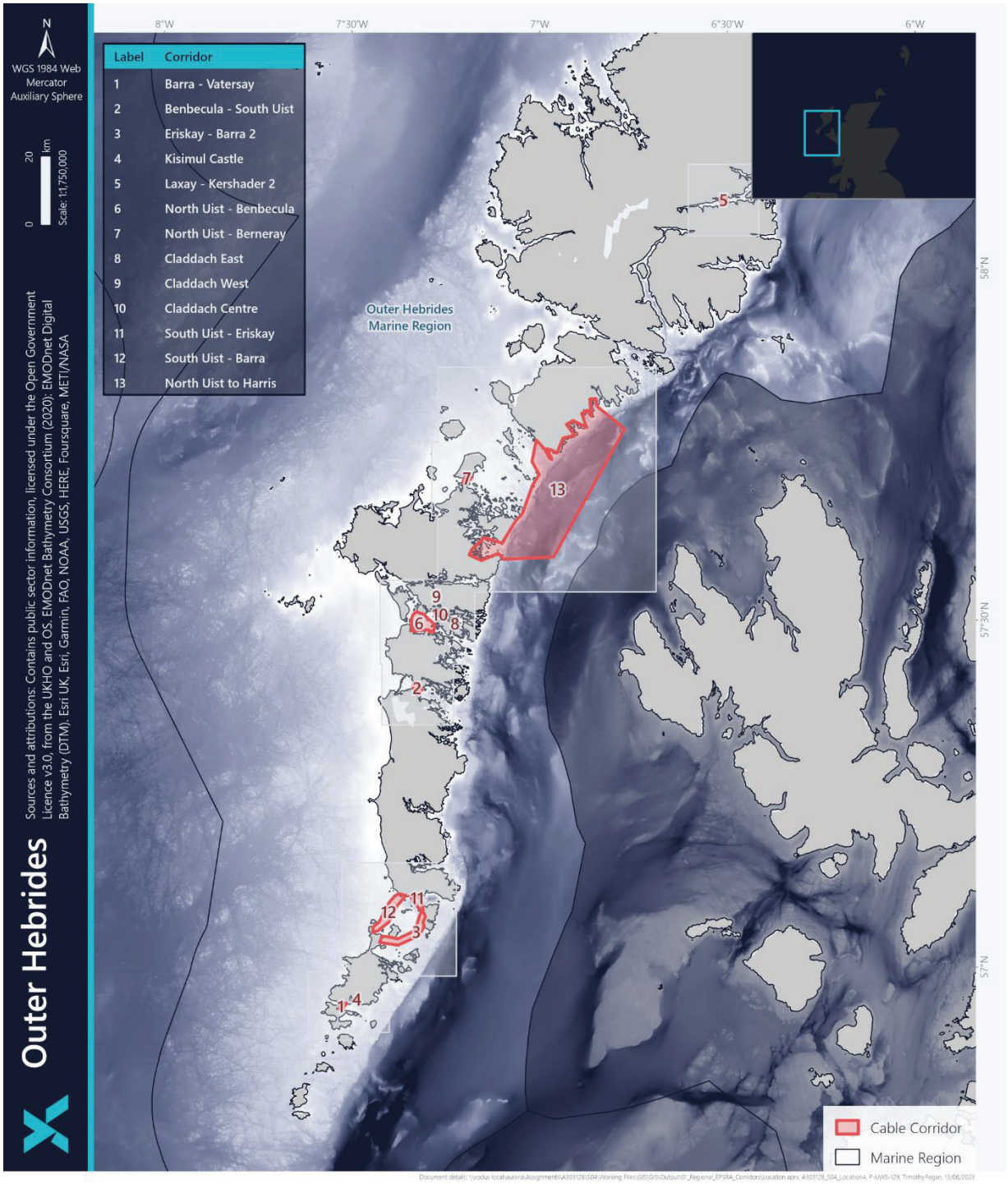


Figure 1-1 Location of Cable Corridors Within the Outer Hebrides Marine Region

1.3 Consents and Licences

Ahead of the proposed cable surveys, all relevant consents and licences need to be obtained. This document provides the relevant information to support the following:

1. An application for an EPS Licence. An EPS Licence is required under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland), referred to as the Habitats Regulations, where there is the potential for the presence of vessels or underwater sound from proposed survey activities to injure or result in disturbance to EPS.
2. An assessment of the potential impacts of proposed works on basking sharks as per the Wildlife and Countryside Act 1981 (as amended) (the WCA).
3. The Habitats Regulations Appraisal (HRA) process, which is conducted by the Competent Authority as prescribed by the Habitats Regulations, to assess if cable inspection works or any proposed surveys have the potential to result in likely significant effects on a European site (either alone or in combination with other plans or projects within the region). The Habitats Regulations state that the effects of a plan or project on a European site need to be assessed and evaluated as part of the HRA process. This includes any European site with a marine component as well as any terrestrial or coastal European sites with a qualifying species or features that could potentially be impacted.
4. An assessment of the potential impacts on Marine Protected Areas (MPAs) (with consideration given to Nature Conservation MPAs, Historic MPAs, and Demonstration & Research MPAs) as per Section 82 of the Marine (Scotland) Act 2010.
5. An assessment of the potential impacts on designated seal haul-out sites as per Section 117 of the Marine (Scotland) Act 2010.
6. Notice of intention to carry out a Marine Licence exempted activity for geotechnical sampling of less than 1 m^3 volume per sample.
7. Notice of intention to carry out a Marine Licence exempted activity for the sediment sampling component of benthic surveys, which will be undertaken in line with NatureScot Guidance Notice No. 45 – Subsea Cable and Oil and Gas Pipeline Proposals – Benthic Habitat and Species Survey Requirements.

For end-to-end cable installation, a separate Marine Licence will be submitted and supported by separate environmental supporting documents which will be informed by, and will incorporate the findings of, the above listed marine surveys and geotechnical investigations.

1.4 Protected Species Overview

1.4.1 European Protected Species (EPS) – Cetaceans and Otters

All species of cetacean (whale, dolphin and porpoise), and the Eurasian otter *Lutra lutra*, occurring in UK waters are listed in Annex IV of the Habitats Directive as EPS, meaning that they are species of community interest in need of strict protection, as per Article 12 of the Directive. Harbour porpoise *Phocoena phocoena* and bottlenose dolphin *Tursiops truncatus* are listed under Annex II of the Habitats Directive and are given additional protection through the designation of Special Areas of Conservation (SACs) for those species, while all other cetaceans are listed as "All [Cetacea] species under Annex IV.

The Eurasian otter is the only native UK otter species and is fully protected as an EPS and under section 9 and 11 of the Wildlife and Countryside Act 1981 (as amended). When considering a certain activity, the presence of an otter as an EPS is a material consideration if the proposals are likely to result in the disturbance or harm to the species.

In Scotland, the Habitats Directive is transposed into law by The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) within Scottish Territorial Waters (from Mean High Water Springs (MHWS) sea level up to the 12 nautical miles (NM) limit), and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in UK Offshore Waters (between 12 and up to 200 NM offshore). An EPS licence is required where an activity may result in an offence under the Habitats Regulations, which in the context of marine surveys, pertains to cetaceans and otters.

As such, an EPS licence is required under the protection afforded in Scottish territorial waters (out to 12 NM) under the Habitats Regulations. Regulation 39(1) of the Habitat Regulations make it an offence to:

a) Deliberately or recklessly capture, injure or kill a wild animal of an EPS;

b) Deliberately or recklessly:

   i. Harass a wild animal or group of wild animals of an EPS.

   ii. Disturb an animal while it is occupying a structure or place which it uses for shelter or protection.

   iii. Disturb an animal while it is rearing or caring for its young.

   iv. Obstruct access to a breeding site or resting place of an animal, or otherwise deny the animal use of the breeding or resting site.

   v. Disturb an animal in a manner that is, or in circumstances which are, likely to result in significant effects to local distribution or abundance of animals.

   vi. Disturb an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

   vii. Disturb an animal while it is migrating or hibernating.

Further protection is afforded through an additional disturbance offence provided under Regulation 39(2) which states that "*it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean)*". An EPS Licence is therefore required for any activity that might result in disturbance or injury to cetaceans or otters.

1.4.2 Basking Sharks

Basking sharks *Cetorhinus maximus* are protected under Schedule 5 of the WCA which prohibits the killing, injuring or taking by any method of those wild animals listed on Schedule 5 of the Act. The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 make amendments to the WCA, strengthening the legal protection for threatened species to include 'reckless' acts, and specifically makes it an offence to intentionally or recklessly disturb or harass basking sharks. A derogation licence under the WCA will therefore be required for any activity which may result in disturbance or injury to basking sharks.

1.4.3 Pinnipeds

The Marine (Scotland) Act 2010 protects both harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus* around Scotland's coast. This Act provides the Scottish Ministers with the power to designate Seal Conservation Areas. The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) prohibits certain methods of catching or killing seals. The Protection of Seals (Designated of Haul-Out Sites) (Scotland) Order 2014 introduces additional protection

for seals from harassment (intentional or reckless) at 194 designated haul-out sites, where harbour seal and grey seal come ashore to rest, moult or breed.

1.4.4 Seabirds

The primary legislation for the protection of birds in the UK is the WCA in combination with the Nature Conservation (Scotland) Act 2004. Under these acts, it is an offence to harm wild bird species, their eggs and nests. Additional protection is provided for certain bird species listed on Schedule 1 of the WCA, and it is an offence to disturb those species at their nest while it is in use.

The proposed development activities are unlikely to result in the intentional or reckless killing of wild birds or the destruction of their nests, but if carried out during the breeding season, such works could result in an offence by disturbing nesting Schedule 1 bird species. Licensing for wild birds does not cover development purposes, so any activity that could result in disturbance of a nesting Schedule 1 species should not proceed unless out-with the breeding season.

1.5 Protected Sites

1.5.1 European sites

The term 'European site' refers to sites previously designated as part of the Natura 2000 site network. European sites recognise Special Protection Areas (SPAs) and SACs that are designated for the conservation of species and habitats across Europe, as originally designated under European legislation.

European sites (SPAs and SACs) form a unique network of protected areas that stretches across the European Union (EU), known as the Natura 2000 site network. Prior to leaving the EU, Scotland's designated sites contributed to this network. These sites also form part of the Emerald Network which spans Europe and into Africa, and European sites in the Scottish Marine Region comprise part of the OSPAR Network of Marine Protected Areas.

European sites were originally designated under The European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC). Following the UK's exit from the European Union in January 2020, European sites continue to be designated under Scottish domestic law and are now referred to as the UK's European Site Network:

In the terrestrial environment and within Scottish Territorial Waters (from MHWS seaward to 12 NM) by:

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland)
- Habitats Directive and Birds Directive (EU legislation).

Outwith Scottish Territorial waters (>12 NM) by:

- The Offshore Habitats Regulations.

SACs were designated under the Habitats Directive for habitats and non-avian species. The Habitats Directive sets out how such European sites should be protected and has a number of wider implications such as those relating to European Protected Species. The Birds Directive protects all wild birds and their nests, eggs and habitats within the European Union. SPAs are classified under the Birds Directive to protect birds that are rare or vulnerable in Europe as well as all migratory birds that are regular visitors.

The above aims to promote the maintenance of biodiversity, by requiring EU Member States to maintain or restore representative natural habitats and wild species at a Favourable Conservation Status (FCS), through the introduction of robust protection for those habitats and species of conservation importance.

As part of these protection measures, Member States are required to undertake assessments to determine whether a plan or project is likely to have an adverse effect on the integrity of a European site. This is implemented in Scotland through the HRA process. The HRA process requires that any proposal which has the potential to result in a negative LSE to a European site or its designated features, to be subject to an HRA by the Competent Authority, if LSE are predicted, an Appropriate Assessment (AA). The HRA/AA process ensures that no activity can be consented if it has the potential to result in LSE to a European site and its qualifying features or species, unless there are no satisfactory alternatives, and there is an Imperative Reason of Overriding Public Interest (IROPI) for the development to go ahead.

Following the UK's exit from the EU, the requirements of the Habitats and Birds Directives and conservation measures associated with designated sites and protected species (including all cetaceans) persist through the interpretation of those directives in UK (and Scots) law.

1.5.2 Nature Conservation Marine Protected Areas (NCMPAs)

Under Section 82 of the Marine (Scotland) Act 2010, Marine Scotland Licensing Operations Team (MS-LOT) is required to consider whether a licensable activity is capable of affecting (other than insignificantly) a protected feature in a NCMPA, or any ecological or geomorphological process on which the conservation of any protected feature in an NCMPA is dependent. If MS-LOT determine that there will be, or may be, a significant effect of a plan or project on the conservation objectives of an NCMPA, then they must notify the relevant conservation bodies (NatureScot for all plans or projects within Scotland).

It is an offence to intentionally or recklessly kill, remove, damage, or destroy any protected feature of an NCMPA. Marine Scotland must be sure that consenting/licensing decisions do not cause a significant risk to the conservation objectives of any NCMPA.

1.5.3 Designated Seal Haul-Outs

Seal haul-outs are coastal locations that seals use to breed, moult and rest. Almost 200 seal haul-out sites have been designated through the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 which was amended with additional sites in 2017. These haul-out sites are protected under Section 117 of the Marine (Scotland) Act 2010. The Act is designed to assist in protecting the seals when they are at their most vulnerable and, as such, provides additional protection from intentional or reckless harassment whilst seals occupy these important coastal sites.

1.6 Determining the need for an EPS Licence

The purpose of the assessments presented in this report is to determine whether, when considering appropriate mitigation as presented in Section 5, there is potential for the cable inspection or marine survey activities to injure or disturb cetaceans, otters or other protected species. Where there is still potential for harm or disturbance to occur, an EPS Licence (or Basking Shark Licence) may be required. The need for an EPS Licence (or Basking Shark Licence) will be determined based on findings from the EPS Risk Assessment. MS-LOT's consideration of whether an EPS Licence will be required will comprise three tests:

1. Whether the licence is to be granted for one of the purposes specified in the Regulations.
2. Whether there are no satisfactory alternatives to the activity proposed (that would avoid the risk of offence).
3. That the licensing of the activity will not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status.

1.6.1 What Constitutes Disturbance

Whether or not a specific activity have the potential to result in 'disturbance' (for the purpose of Article 12(1) (b) of the Habitats Directive) depends on the nature of the particular activity and the potential impact on a particular species. Whilst 'disturbance' is not defined in the Habitats Regulations, Marine Scotland (2020a) advise that the following matter should be taken into account when considering what constitutes disturbance:

- Changes in (direction or speed of) swimming or diving behaviour;
- Bunching together or females shielding calves;
- Changes in breathing patterns;
- Changes in vocalisation;
- Aggression, agitation or panic behaviour;
- Certain surface behaviours such as tail slashes and trumpet blows; and
- Moving out of an area previously occupied.

Changes in behaviour akin to those described above may not appear to be detrimental in the short-term. The long-term consequences, however, are not yet well understood, but could be significant. Additionally, the effects may be minor in isolation, but may become significant in accumulation. The following are some of the potential problems that may be caused by disturbance:

- Displacement from important feeding areas;
- Disruption of feeding;
- Disruption of communication, migration, breeding, nursing, feeding, resting and other social behaviours;
- Abandonment of preferred breeding or calving sites;
- Changes to regular migratory pathways to avoid areas of human interaction;
- Increased vulnerability of an individual or population to predators or physical stress;
- Increased risk of injury or mortality; and
- Excessive use of energy leading to loss of condition (caused by continual or repeated avoidance or flight).

Certain activities in marine and coastal areas may disturb cetaceans, potentially through creating noise and physical barriers to movement. The scale and likelihood of disturbance impacts will be determined by the location, time of year and nature of the activity.

Where there is the possibility for injury or disturbance to occur, an EPS Risk Assessment must be carried out and the need for an EPS Licence determined. The injury and disturbance criteria for EPS are described in Section 3.4.1.

1.7 Document Structure

This document provides the necessary information to support the EPS licensing, protected species and protected sites assessment process as per the following:

- Section 2 – provides a description of the risk to EPS and other protected species.
- Section 3 – provides an assessment of the risk to EPS and other protected species.
- Section 4 – provides an assessment of potential impacts on protected sites and designated seal haul-outs.
- Section 5 – outlines the proposed species protection measures to be implemented.
- Section 6 – presents the overall conclusions of the assessment.
- Appendix A – table of cable corridor coordinates.
- Appendix B – individual cable corridor and cable maps.

2 DESCRIPTION OF PROJECT ACTIVITIES

2.1 Location of Activities

A list of the cable routes for the Outer Hebrides Marine Region is given in Section 1.2. These cable routes are within wider cable survey corridors and a list of these cable corridors, and the cables contained within are provided in Table 2-1 below. The co-ordinates for each cable corridors have been provided in Appendix A – Cable Corridor Coordinates and individual cable corridor maps are provided in Appendix B. The total area covered by the cable survey corridors is approximately 260 km^2.

Table 2-1 Cable Routes and Indicative Cable Corridors

Cable Corridor Name	Cables within corridor	Indicative corridor area (km^2)
Barra – Vatersay	Barra - Vatersay	0.69
Benbecula – South Uist	Benbecula - South Uist East	1.33
	Benbecula - South Uist West	
Eriskay – Barra 2	Eriskay - Barra 2	9.69
Kisimul Castle	Kisimul Castle	0.21
Laxay – Kershader 2	Laxay - Kershader 2	0.73
North Uist – Benbecula	North Uist - Benbecula West	8.35
	North Uist - Benbecula East	
	North Uist - Benbecula Centre	
North Uist – Berneray	North Uist - Berneray	0.91
Claddach East	Claddach East	0.15
Claddach West	Claddach West	0.21
Claddach Centre	Claddach Centre	0.007
South Uist – Eriskay	South Uist - Eriskay	2.28
South Uist - Barra	South Uist - Barra	9.29
North Uist to Harris	North Uist to Harris	225.97

2.2 Summary of Project Activities

2.2.1 Overview

The proposed cable surveys will be undertaken to confirm cable position, assess cable condition and provide information to help determine whether any future maintenance, replacement or new cable routes are required (or if there has been any third-party damage). The results of the geophysical survey will be used to inform future routeing of replacement cables and/or the requirement for additional cable protection. If the results of the surveys identify cable routes that require maintenance or replacement, these maintenance or replacement activities will be covered

by a separate Marine Licence application. As such any repair, maintenance or installation activities have not been included within this assessment.

Testing and Calibration of Survey Equipment

Prior to survey activities commencing, the survey equipment and sensors will need to be tested and calibrated. Testing and calibration may be required for all survey equipment that will be utilised during the survey activity, as detailed in Table 2-2. It is anticipated that the testing and calibration will take approximately 24 hours per vessel per survey mobilisation. There will be approximately six vessel mobilisations per year for each cable corridor.

The exact location of the testing and calibration sites is unknown at this stage, where possible this would be undertaken within the survey corridor. It is however noted that specific bathymetric conditions and features are required to facilitate testing and calibration; where these are not available within the survey corridor, an alternative location will be utilised.

Since the vessels, equipment, and activities required for testing and calibration will be the same as those used during geophysical survey works, the potential impacts on protected species and sites resulting from testing and calibration will be analogous to those resulting from the main survey phase.

Geophysical and Geotechnical Surveys

The geophysical surveys will typically be carried out by two vessels. A typical scenario for their use is considered to be:

- A large (> 50 m) survey vessel will be utilised throughout offshore waters.
- A smaller nearshore survey vessel/ Uncrewed Surface Vehicle (USV) will be deployed in shallower, coastal waters.

It is noted that an additional nearshore vessel may be required to meet any time and logistical constraints, hence, up to three survey vessels (one large offshore, and two small nearshore) could be operating simultaneously in the region. Offshore survey operations will be executed on a 24-hour basis by the larger survey vessel, whilst inshore survey operations will be executed on a 12-hour basis (during daylight working hours only) by the smaller vessels.

Survey vessel selection and deployment will be made prior to survey operations and will be informed by a number of factors. These include environmental considerations, weather and sea state, survey requirements and water depth. In addition to the survey vessels there may also be small supporting vessels in attendance, depending on the activity.

Table 2-2 outlines the types of activities that are associated with the geophysical, geotechnical and environmental surveys.

It should be noted that examples of potential survey vessels to be utilised during the offshore and nearshore survey activities are provided in Table 2-3 as part of Section 2.2.2.

Table 2-2 Summary of the Activities Associated with the Different Survey Types

Activities	
Vessels and Vehicles	Survey Vessel
	Uncrewed Surface Vehicle (USV)
	Rigid Inflatable Boat (RIB) / Multicat
	Diving Support Vessel (DSV)

Activities	
	Autonomous Underwater Vessel (AUV)
	Uncrewed Aerial Vehicle (UAV)
	Remotely Operated Vehicle (ROV)
	Remotely Operated Towed Vehicle (ROTV)
Geophysical Survey	Ultra-short Baseline (USBL) positioning system
	Side Scan Sonar (SSS)
	Multi Beam Echosounder (MBES)
	Single Beam Echosounder (SBES)
	Sub-bottom profiler (SBP)
	Magnetometer (MAG)
	Cable tracker system
	Subsea altitude metre
	Sound velocity profiler (SVP)
	Acoustic Doppler Current Profiler (ADCP)
	Obstacle Avoidance Sonar
Benthic Habitat Analysis	ROV survey / inspection
	Drop-down camera video / photo
	Benthic sediment grab sampling
Geotechnical survey	Vibrocoring / Piezocone Penetration Testing (PCPT)
Landfall area investigations	Landfall topographical survey (note; this is not part of this application as above mean high water spring (MHWS))

2.2.2 Vessels and Vehicles

Vessels will be mobilised as required from a pre-agreed mobilisation port depending on which cable or set of cables are being surveyed. The type and number of vessels required to complete the required surveys will vary depending on the physical parameters of the cable and the survey area (such as the cable length and water depth).

The contractors that will be employed to conduct the surveys have not yet been selected, and therefore exact details for the vessels that will be used for the proposed surveys is not available. The vessels detailed in Table 2-3 are of a similar size and type to those that could be utilised for survey works and have been used as proxy vessels for this EPS and Protected Sites and Species Risk Assessment. The vessels go up to the maximum size that could be provided by the contractors, thereby providing a worst-case scenario and offering maximum flexibility in the survey procurement process.

Table 2-3 Example Vessels and Vehicles that Could be Used During Inspections and Surveys

Example Vessel / Vehicle	Description
Survey	
Vessel for ROV surveys – DP2 vessel	Purpose-designed vessel for ROV surveys, Inspection Repair and Maintenance (IRM) and construction support. Generally, diesel-electric, DP2 vessel that has advanced DGPS, USBL acoustic system and a Seapath 200. Typically, these vessels utilise Launch and Recovery System (LARS). The typical lengths of vessel can be 85 m, breadth 20 m, deck area 630 m^2 and draught 6 m.
Multi-purpose vessel – both geophysical and geotechnical survey	Multi-purpose vessel which will typically have diesel-electric propulsion and a specially designed hull. Vessel will be suitable for geophysical and geotechnical survey operations up to 1000 m water Depth. Typical length is expected to be 54 m, beam 12.5 m, deck area is 250 m^2 and the draught 3 m.
Multi-purpose DP1 vessel – shallow and medium depth water	Multi-purpose DP1 vessel designed for survey operations in shallow and medium water depths. The vessel will be suitable for geophysical surveys, ROV support operations for up to light Work-Class vehicles, geotechnical CPT and vibrocoring, and environmental surveys. Typical length is expected to be 54 m, beam 12.5 m, deck area is 250 m^2 and the draught 3 m.
Vessel for inshore shallow water hydrographic and geophysical surveys	Purpose built vessel for hydrographic and geophysical surveys which is typically equipped for 12 hour operations up to 60 NM from save haven. Typical length is expected to be 12 m, beam 5 m and the draught 2 m.
Vessel for offshore deep water hydrographic and geophysical surveys	Geophysical survey vessel equipped with permanently mobilised geophysical and hydrographic survey spreads. Often, this type of vessel has diesel-electric propulsion and specially designed hulls. The equipment of this vessel will include MBES, single beam echosounders, sub bottom profilers and side scan sonar. Typical length of vessel is expected to be 65 m, beam 14 m, deck area is 250 m^2 and the draught 5 m.
Vessel for deep water	Purpose built IMR and ROV vessel, designed for deep water remote intervention, renewables, construction and survey works. Typical length of this type of vessel is expected to be 130 m, beam 24 m, and draught of 7.5 m.
Uncrewed Surface Vehicle (USV)	A 2-3 m long untethered ROV which floats on the water's surface as a platform of deployment for geophysical survey equipment used in seabed or water column mapping. They are operated using battery power.
Autonomous Underwater Vehicles (AUV)	An uncrewed, untethered subsea vehicle which is remotely piloted from a surface operator and are often battery powered.
Remotely Operated Vehicle (ROV)	An uncrewed vehicle which is tethered to a vessel/mothership which is powered via electrical cables and hydraulic pumps. ROVs carry various instruments, image and sampling equipment used in benthic surveys and, on occasion, some geophysical survey equipment.
Remotely Operated Towed Vehicle (ROTV)	An uncrewed towed vehicle used to deploy survey sensors including MBES, MAG, SSS, and SBP.
Uncrewed Aerial Vehicle (UAV)	Also known as 'drones,' UAVs are uncrewed aircraft deployed for a variety of purposes, including aerial imagery used in surveys.

2.2.3 Survey Techniques

A range of different equipment would be deployed during the proposed surveys of the cable routes (see Table 2-2). The survey techniques that would be adopted are described in detail in Table 2-4. The proposed survey techniques have been assessed for their potential to introduce underwater sound profile into the marine environment and/or interact with protected species or seabed habitats within the marine region. The most significant acoustic aspects potentially generated by the proposed survey works are detailed within Table 3-1, along with a determination as to whether these survey techniques require further assessment of potential impacts.

Table 2-4 Details of the Equipment to be Employed for the Surveys of the Cable Routes

System / Survey Equipment	Description
Geophysical Survey	
Ultra-Short Baseline (USBL)	USBL systems are used to determine the position of subsea survey equipment, including ROVs, towed sensors, etc. This involves the emission of sound from a vessel-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. A USBL system consists of a transducer, which is commonly mounted on the vessel, and a transponder attached to the survey equipment (e.g. ROV). The transducer transmits sound through the water and the transponder sends a response which is detected by the transducer. The USBL calculates the bearing and time taken for the transmissions to be completed and thus can estimate the position of the subsea unit / sampling equipment. These systems can either be used continuously or intermittently through the operation they are supporting. In the shallowest regions of the nearshore environment, alternative positioning methods (e.g., layback and position calculations) may need to be considered.
Multi-beam echo-sounder (MBES)	MBES are used to obtain detailed three-dimensional (3D) maps of the seafloor which show water depths. They measure water depth by recording the two-way travel time of a high frequency pulse emitted by a transducer. The beams produce a fanned arc composed of individual beams (also known as a swathe). Multi-beam echo-sounders can, typically, carry out 200 or more simultaneous measurements. With respect to this project, the MBES specifications are to be high resolution e.g. max. ping space of 25 cm or 9 pings per square metre with a towed array. Sound sources with a frequency below 200 kilohertz (kHz) will not be used during survey works, and have therefore been scoped out of further assessment on the basis that they are out-with the generalised hearing range for EPS and other protected species likely to be affected by underwater noise. Nonetheless, the Kongsberg EM710 has been identified as a specific MBES equipment which may be required in the completion of these works. This equipment operates within a frequency range of 70-100 kHz with sound pressure levels in the range of 225- 231 dB re 1 µPa at 1 m range. Given that that these frequencies fall within the hearing range of High Frequency (HF) and Very High Frequency (VHF) cetaceans, this specific equipment has been scoped in for further assessment. However, it should be noted that the equipment supports a "Marine Mammal Protection Mode" which effectively reduces the power outage. The intensity level may be lowered by 10 or 20 dB by the operator. The EM710 may also be set in a mode to begin pinging with a flexible soft-start as a possible means of inducing marine mammals to leave the area of high intensity sound. As such, this mitigation will be used with regard to this equipment as discussed in Section 5.
Side-scan Sonar (SSS)	SSS is used to generate an accurate image of the seabed, which may include 3D imagery. An acoustic beam is used to obtain an accurate image of a narrow area of seabed to either side of the instrument by measuring the amplitude of back-scattered return signals. The instrument can either be towed behind a ship at a specified depth or mounted on to a ROV. The frequencies used by side-scan sonar are generally very high and outside of the main hearing range of all marine species (The National Oceanic and Atmospheric Administration (NOAA), 2018). Higher frequency systems

System / Survey Equipment	Description
	provide higher resolution but shorter-range measurements. Frequency levels below 200 kHz will not be used during survey activities and have therefore been scoped out of further assessment on the basis that they are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Single Beam Echosounder (SBES)	SBES operate in a similar manner to MBES; rather than measuring multiple points per acoustic echo wave (echo) emitted, SBES can only measure one point at a time. The preferred equipment is a Kongsberg EA600.
Sub-Bottom Profilers (SBP)	SBP systems are used to identify and characterise layers of sediment or rock under the seafloor. A transducer emits a sound pulse vertically downwards towards the seafloor, and a receiver records the return of the pulse once it has been reflected off the seafloor. SBP systems which may be employed for these surveys include pingers and boomers. Pingers operate at a higher frequency but smaller bandwidth than boomers, which operate on a lower broadband frequency spectrum. The higher frequencies of operation provide the highest resolution but are limited in amount of penetration below the sea floor. The high frequency profilers are particularly useful for delineating shallow features such as faults, gas accumulations and relict channels. The lower frequencies yield more penetration but provide lower resolution. Lower frequency systems are more general-purpose tools that provide a good compromise between penetration capacity and resolution. Parts of the sound pulse from both systems will penetrate the seafloor and be reflected off the different sub-bottom layers, providing data on the sub-floor sediment layers. Unlike the pinger system which has a combined transducer/transceiver deployed in-water from the vessel, the boomer system requires the deployment of a boomer plate and a receiver array that is a separate floating unit from the emission source.
Magnetometer survey (MAG)	Magnetometer surveys are used to detect any ferrous metal objects on the seabed, such as wrecks, unexploded ordinance (UXO), or any other obstructions. Marine magnetometers come in two types: Surface towed and near-bottom. Both are towed a sufficient distance (about two ship lengths) away from the ship to allow them to collect data without it being polluted by the ship's magnetic properties. Surface towed magnetometers allow for a wider range of detection at the price of precision accuracy that is obtained by the near-bottom magnetometers. These surveys use equipment to record spatial variation in the Earth's magnetic field and do not emit sound.
Cable tracker system (magnetic)	Various geophysical methods may be used to locate and survey the depth of burial of cables. Passive magnetic and active electromagnetic sensors can be used to detect and track buried cables underwater. With these types of equipment, the depth of burial can be determined through modelling. To assess the coverage of underwater cables electromagnetic systems will be used. Cable tracker systems do not emit sound.
Subsea altitude meter	Subsea altitude meter (altimeters) utilise ultra-high frequency sonar technology to make precision underwater distance measurements by measuring the time it takes for sound pulses to travel from the altimeter to the seafloor and back to the altimeter. The altimeter will be attached to the magnetometer. These devices emit high frequency pulses to measure distance. These sound pulses are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Sound velocity profiler (SVP)	The SVP continuously emits high frequency pulses as it is lowered towards the seafloor in order to measure the speed of sound within the water column. This technology also makes use of sonar to determine how quickly sound attenuates in the marine environment, which can aid in calibrating geophysical survey equipment. These devices emit high frequency pulses to measure sound velocity.

System / Survey Equipment	Description
	These sound pulses are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Acoustic Doppler Current Profiler (ADCP)	An ADCP is a hydro-acoustic current meter similar to a sonar, used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column. Transducers on the ADCP transmit and receive sound signals in the form of high frequency pulses, and the data is then processed to calculate the Doppler shift, and thus the water velocity along the acoustic beams. ADCPs are generally deployed from a small vessel, using a davit arm, and placed on the seabed where it remains for one lunar cycle, transmitting and recording continuously. To aid location at the end of the lunar cycle, an acoustic beacon (which lies passively during the survey period) is activated when the vessel returns. An ROV or diver attaches a line and it is then recovered onto the vessel. These devices emit high frequency pulses to measure current velocity. These sound pulses are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise. Acoustic Wave and Current (AWAC) is a type of ADCP which measures wave and currents. Doppler Velocity Logger (DVL) is a type of ADCP which measures the speed and direction of ROVs etc. These ADCPs may be required for the survey and will operate in deep waters >1000 m. Most types of ADCPs operate at high frequency between 300kHz and 1200kHz and as such are outwith the generalised hearing range for EPS and other protected species likely affected by underwater noise.
Obstacle avoidance sonar	High frequency pulses created by obstacle avoidance sonar systems produce sound waves which are used to identify small objects and hazards on the seabed. Higher frequency pulses provide higher resolution imaging. These devices emit high frequency pulses and have been scoped out of further assessment on the basis that the sound pulses they produce are outwith the generalised hearing range for EPS and other protected species likely to be affected by underwater noise.
Geotechnical Sampling	
Vibrocoring (with PCPT)	Geotechnical sampling will also be undertaken as part of the marine survey. This may include both vibrocoring operations and PCPT[1]. Vibrocoring operations will be undertaken using a high power vibrocorer which will be deployed from both the offshore and nearshore vessels. The PCPT will be carried out from both the offshore and nearshore vessels using piezocones that will be pushed into the seabed to collect samples in order to allow determination of the geotechnical engineering properties of the sediment and delineation of the seabed stratigraphy. The vibrocoring equipment, including PCPT, does not have the potential to generate significant levels of noise. Therefore, this technology does not require any further consideration with respect to possible injury or disturbance to protected species and sites. The USBL system may be used to determine the sampling locations when undertaking vibrocoring and PCPT operations.

[1] An *in situ* testing method used to determine the geotechnical engineering properties of soils and assessing subsurface stratigraphy, relative density, strength and equilibrium groundwater pressures.

System / Survey Equipment	Description
Benthic Habitat Analysis	
ROV survey / Observations	An ROV is a tethered underwater mobile device. ROVs are commonly used for visual surveys of the seafloor. For underwater positioning a USBL system is used. The ROV is manoeuvrable by the use of thrusters. The ROV survey does not have the potential to generate significant levels of noise.
Drop-down video/ photography	Ground-truthing of acoustic data will be undertaken using drop-down video/photography (drop frame and/or ROV) and grab sampling techniques (see below). This survey technique does not interact with the seabed. It is required to provide detail on epifaunal species (animals living on the surface of the substrate), habitats and geological features. The survey methodology will follow the Scottish Natural Heritage (SNH) (now NatureScot) Guidance Notice No. 45 – Subsea Cable and Oil and Gas Pipeline Proposals – Benthic Habitat and Species Survey Requirements and consultation will be undertaken with SNH and Marine Scotland to ensure sufficient sampling frequency. Drop-down video/photography does not have the potential to generate significant levels of noise.
Benthic Sediment Sampling	Grab samples will be taken of the seabed to provide detail on the sediment itself and infauna (animals living within the substrate) which cannot be provided by the use of video and photography. Grab samples will not be collected on hard substrates and will be minimised at locations with sensitive habitats. As such, grab sampling will be preceded with video/camera drops. The survey methodology will follow the SNH Guidance Notice No. 45 – Subsea Cable and Oil and Gas Pipeline Proposals – Benthic Habitat and Species Survey Requirements and consultation will be undertaken with SNH and Marine Scotland to ensure sufficient sampling frequency. The benthic sediment sampling equipment does not generate potentially significant levels of noise. Therefore, this technology does not require any further consideration with respect to potential injury or disturbance of protected species. Any benthic sampling will be subject to a future Marine Licence Exemption application.
Landfall Area Investigations	
Landfall topographical survey	The intertidal part of the cable route will be inspected by an onshore survey team, using standard topographic survey equipment. This survey activity will include two surveyors carrying the equipment along the beach. The landfall topographic survey technique does not generate potentially significant levels of noise, nor does it interact with the seabed. Therefore, this technology does not require any further consideration with respect to potential noise-generated injury or disturbance of EPS or impacts to protected sites. While the landfall topographical survey will not generate significant levels of noise to generate injury or disturbance to EPS, there is potential for disturbance to semi-aquatic EPS (i.e., otters) from human presence at the landfall sites.
Hand augers and hand dug trial pits	Hand augers and hand dug trial pits may be required in the intertidal zone. This will not occur in areas of sensitive habitats. These techniques do not create significant levels of sound and therefore this activity does not require any further consideration with respect to potential noise generated injury or disturbance of EPS, nor impacts to protected sites.

It is recognised that UXO could, as in many areas, be identified during survey operations. Should UXO be identified, SHEPD will consult with all relevant agencies prior to determining a course of action. No removal or remediation activities would be progressed in advance of such consultation. SHEPD recognise the potential need for further assessment and licensing should UXO remediation be required.

2.2.4 Activity Schedule

The cable route survey activities in the Outer Hebrides Marine Region are scheduled to be undertaken sometime between 1st October 2023 and 30th September 2028. Whilst this is a period of 1,827 days in total, survey activities will be for much shorter durations.

In total survey activities on all 16 cable routes within the Outer Hebrides Marine Region are expected to take approximately 173 days in total which includes 116 days of allowance for weather downtime, transit between sites and waiting on tides, with an additional 24 hours allowed for equipment calibrations for each survey mobilisation. There will be 6 vessel mobilisations per survey cable corridor.

Please note, the duration of activities represents a worst-case scenario for each standalone cable route survey. Overall, for the purposes of this assessment it has been assumed that all cable routes within the Outer Hebrides Marine Region require surveys twice prior to 30th September 2028.

For all survey activities, no allowance for time has been included for the following categories as estimation of these is considered to be beyond the reasonable limits of the assessment. Nonetheless each has the potential to impact on delivery of the survey scope and increase the overall timescale of the surveys:

- Third party activities (e.g., fishing, other users);
- Technical equipment issues;
- Environmental mitigation standby; and
- Force majeure.

3 EPS AND OTHER PROTECTED SPECIES RISK ASSESSMENT

3.1 Overview

The primary function of this EPS and Protected Sites and Species Risk Assessment is to identify the potential for injury or disturbance to EPS and other protected species from the testing and calibration of geophysical survey equipment and the undertaking of geophysical surveys across the Outer Hebrides Marine Region. This section of the risk assessment addresses potential impacts to protected species, including EPS, regardless of their inclusion as qualifying features of protected sites. An assessment of potential impacts to protected sites and their qualifying features is provided in Section 4 – Protected Sites Assessment.

A number of survey activities will be employed as part of the proposed survey works, each with varying levels of risk to protected species and habitats. These include:

- Vessel activity;
- Survey equipment calibration testing; and
- Geophysical surveys of the seabed.

An overview of survey activities and their potential impacts to protected species is provided in Table 3-1. As detailed in Section 2.2.4, the duration of activities represents a worst-case scenario for each standalone cable route survey. Overall, for the purposes of this assessment it has been assumed that all cable routes within the Outer Hebrides Marine Region require surveys twice prior to 30th Sepetmber 2028.

Underwater noise emitted by survey vessels and the physical presence of the vessels during the survey period have the potential to cause injury or disturbance to EPS and other protected species.

While some survey techniques may introduce underwater sound to the marine environment, other activities do not generate sufficient levels of sound to be considered as potential sources of acoustic injury or disturbance to protected species and have been screened out of the detailed assessment, as indicated in Table 3-1.

Table 3-1 Overview of Potential Impacts of Marine Survey Activities on EPS and Other Protected Species within the Outer Hebrides Marine Region

Activity / Equipment	Potential Impacts	Further information Required as Part of the EPS Risk Assessment?
Vessels and Vehicles		
Survey and post survey vessels	Propellers, engines, and propulsion activities form the primary noise sources of survey vessels. Vessel noise is generally continuous and comes in both narrowband and broadband emissions. Potential impacts on EPS and other protected species depend on the duration of the survey activities, location of the survey routes and species of cetacean potentially present in the area.	No –The source levels associated with vessels are likely to be too low to result in injury, and the presence of three survey vessels in the Outer Hebrides region does not constitute a change from baseline conditions. It is acknowledged that vessels pose a collision risk to EPS and other protected species. While this does not constitute a change from baseline, all vessels will adhere to The Scottish Marine Wildlife Watching Code (SMWWC)
Guard vessels		
RIB / Multicat / DSV		

Activity / Equipment	Potential Impacts	Further information Required as Part of the EPS Risk Assessment?
	Increased vessel activity additionally has the potential to cause injury from collisions. The risk of collision with an animal is influenced by the dimensions of the vessel and its speed.	(SNH, 2017), during operations, as detailed in Section 5.2.
Vessel and human presence	The presence of vessels and survey personnel may be source of visual disturbance.	Yes – survey operations close to shore of in the intertidal zone may result in disturbance of seals, otters and birds.
Uncrewed Surface Vehicle (USV)	USVs are controlled and maneuvered using batteries which power propellers and thrusters. Noise generated by USVs is similar to other vessels (i.e., continuous and broadband) but reduced in power due to their smaller size.	No – the predominant sound source during USV deployment is the SBP, with the MBES forming a secondary noise source. The USV itself does not generate significant levels of underwater sound. Both SBP and MBES have thus been considered separately (see below).
AUV	Potential impacts to EPS and other marine mammals include disturbance from sound emissions associated with movements underwater. However, these are anticipated to be limited in scale, given the small size of the submerged vehicles. Collision risk is considered an unlikely impact, given the high level of manoeuvrability and slow movement associated with AUVs, ROVs and ROTVs.	No – the predominant sound source during such activities is the USBL, and other geophysical survey sensors deployed on the vehicle, which is expected to mask any sound generated by the vehicle itself. Sound generated by geophysical survey devices has been considered separately (see below).
ROV		
ROTV		
UAV	Disturbance from UAVs may result from noise emissions or visual cues associated with UAV presence, such as its movement or shadow. Flight altitude appears to be the most important factor in determining the behavioural response of marine mammals, including EPS, to UAVs. However, environmental factors, including ambient noise levels and weather (i.e. sunniness), also play an important role in the likelihood of a disturbance event transpiring. UAVs could cause disturbance to nesting, roosting or foraging seabirds and as such care will be taken when utilising this equipment to avoid sensitive locations and periods such as important winter foraging grounds, and bird nesting sites.	No –The sound levels associated with the UAV) are too low to result in injury (Christiansen *et al.*, 2016), and there remains the potential for a disturbance offence to EPS (Fettermann *et al.*, 2019; Ramos *et al.*, 2018). Dolphins have been observed exhibiting low overall responsiveness to UAVs, which tended to be when they were directly approached or followed by the UAV (Ramos *et al.*, 2018). Dolphin's responses involved investigational behaviour including side-roll and spin-and-orient. The duration of the response was short, and the animals seemed minimally impacted (Ramos *et al.*, 2018). Disturbance responses were observed when UAVs were flown at 10 m altitudes, whereas no significant disturbance was recorded at 25 m or higher (Fettermann *et al.*, 2019). However, UAV surveys will only be conducted at landfall and very nearshore locations, where marine mammals are unlikely to be present. Birds may be present at the landfall, however, and as such mitigations will be followed as set

Activity / Equipment	Potential Impacts	Further information Required as Part of the EPS Risk Assessment?
		out in Section 5, to ensure nesting or foraging birds are not disturbed whilst utilising this equipment.
Geophysical Survey		
USBL positioning system	USBL systems involve the emission of impulsive sound from a hull-mounted transducer to a subsea transponder, thereby introducing sound into the marine environment. The potential impacts of this sound on cetaceans depends upon the abundance, distribution and sensitivity of the species, and the duration of the operations.	Yes – The pressure levels and frequencies at which the USBL emit are not of a level where there is a realistic injury risk but have the potential to cause disturbance to marine mammals and other protected species.
SSS	SSS equipment produces impulsive sound emissions through high frequency pulses used to image the seabed habitat. Potential impacts to EPS and other marine mammals depend upon the frequency, location, and duration of the pulses.	No – The SSS used for the proposed survey operations will operate at frequencies above 200 kHz. This is above the hearing range of all marine mammals and protected species which may be present in the area (as detailed in Table 3-3. Hence no potential for injury or disturbance exists (NOAA, 2018).
MBES	High frequency noise pulses created by multi-beam echo sounder equipment generate sound waves which produce impulsive underwater noise. Depending on the frequency of the pulses, location and duration of the operations, and the species present, there could be potential impacts on cetaceans.	Yes – Although the MBES used for the majority of proposed survey operations will operate at frequencies between 200-400 kHz, which is above the hearing threshold of all marine mammals and protected species which may be present in the area, there is the potential that the Kongsberg EM710 which operates between 70 – 100 kHz may be required for certain surveys. As this is within the hearing range of HF and VHF cetaceans (as detailed in Table 3-3) and could potentially cause disturbance or injury, this specific equipment has been screened in for assessment. It should be noted that it is unlikely that this equipment will be used but cannot be ruled out. It will possess mammal protect feature, reduced power output, and the intensity level may be lowered by 10 or 20 dB as discussed in the mitigation section (Section 5).
SBP	Sub-bottom profiling involves the vertical emission of sound pulses (impulsive noise) to characterise the layers of sediment comprising the seabed. Such activities introduce noise emissions into the marine environment. The potential impacts of this sound depend upon the type of profiler technology used, as well as the	Yes – Although source pressure levels emitted by this equipment are unlikely to pose a realistic injury risk to any marine mammal species, this equipment may be a source of disturbance to marine mammals or other protected species.

Activity / Equipment	Potential Impacts	Further information Required as Part of the EPS Risk Assessment?
	abundance, distribution and sensitivity of the species, and the duration of the operations. There are numerous SBP technologies that may be deployed during the survey operations including: pingers, chirpers, and boomers. Another SBP technology which may be employed during survey activities is a sparker. A sparker uses a spark across a pair of electrodes to create a gas bubble whose oscillations generate the sound.	
Subsea Altitude Meter	Subsea Altitude Meters, SVPs and ADCPs all rely on high frequency pulsed sounds to gather data on the marine environment. Subsea altimeters use sonar to identify the distance to the seafloor, while SVPs are used to measure the speed of sound within the water column to calibrate geophysical survey equipment with. Alternatively, ADCPs emit very high frequency doppler waves and use the backscatter of those sound waves to measure current speeds and directions within the water column.	No - the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal or other protected species from noise emitted by this equipment.
SVP		No - the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal or other protected species from noise emitted by this equipment.
ADCP		No - the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal or other protected species from noise emitted by this equipment.
Obstacle Avoidance Sonar	High frequency pulses created by obstacle avoidance sonars produce high frequency sound waves which can be used to generate high-resolution images of the seabed. As such, there is potential for auditory damage to occur. Nevertheless, the high frequency emissions used by this technology causes sounds to attenuate very quickly and become rapidly lost to the marine environment.	No - the noise source frequencies fall outwith the hearing range of marine mammals. There is no potential for injury or disturbance to any marine mammal or other protected species from noise emitted by this equipment.

3.2 European Protected Species

3.2.1 Cetaceans

All cetacean species present within UK waters are considered 'species of community interest' under Annex IV of the Habitats Directive and therefore require strict protection as EPS. The strict protection to all cetaceans as EPS is enshrined in domestic legislation through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), while bottlenose dolphin and harbour porpoise have further protection under Annex II of the Habitats directive, which regulates the designation of SACs for those species.

Approximately 20 cetacean species have been recorded off the west coast of Scotland, with eight noted as relatively common within the survey region (the Hebridean Whale and Dolphin Trust (HWDT, 2018), these are: harbour porpoise, minke whale *Balaenoptera acutrostrata*, common dolphin *Delphinus delphinus*, bottlenose dolphin, white-beaked dolphin *Lagenorhynchus albirostris*, Risso's dolphin *Grampus griseus*, killer whale *Orcinus orca* and long-finned pilot whale *Globicephala melas* (HWDT, 2018). The following summarises those species common within the Outer Hebrides marine region:

- Harbour porpoises are distributed throughout coastal and shelf waters across the sub-Arctic, favouring the cool waters of the North Atlantic and the North Pacific (WDC, 2023). Harbour porpoises frequent shallow bays, estuaries and tidal channel (<200 m in depth) with the majority of animal sightings occurring within 10 km of the coast (WDC(a), 2023). Harbour porpoises are the most abundant cetacean species within the waters of the Outer Hebrides marine region and are likely to be present in the region throughout the year (HWDT, 2018).
- Minke whale is the most abundant of the baleen whales within Scottish waters (NatureScot, 2023). Minke whales occur in waters <200 m in depth and can commonly be seen in coastal waters between July and September (NatureScot, 2023a). The northeast and south of the Outer Hebrides marine region constitutes a region of high sighting rates of minke whales, accounting for approximately 7% of all minke whale sightings in the region (HWDT, 2018). Minke whale is a designated feature of the Sea of the Hebrides NCMPA.
- Common dolphins are widely distributed throughout tropical and temperate waters in the nearshore and offshore marine environment. Common dolphin sightings have increased in the waters of the Inner Hebrides and south of the Outer Hebrides throughout the last decade, especially between April and October (HWDT, 2018). Common dolphins are considered summer seasonal visitors to the region, with recorded sightings decreasing during the winter months (HWDT, 2018).
- Bottlenose dolphins occur in waters throughout the UK, with sightings common in the Moray Firth, Cardigan Bay and around the coast of Cornwall (The Wildlife Trust, 2023). Bottlenose dolphins are found in small resident or semi-resident populations in scattered coastal locations along the west coast of Scotland. Survey data provided by HWDT indicates that the presence of a resident bottlenose dolphin population around the south of the Outer Hebrides, and they are present throughout the year (HWDT, 2018).
- White-beaked dolphins have a relatively limited distribution in the temperate and cold waters of the North Atlantic. White-beaked dolphins are typically found in water of <200 m in depth (WDC(b), 2023). White-beaked dolphins have been sighted in waters around the north coast of the Outer Hebrides and have been recorded in the survey region throughout the year (HWDT, 2018).
- Risso's dolphins can be found in almost all temperate and tropical waters around the world, demonstrating a preference for the deeper waters associated with the edge of continental shelves (WDC(c), 2023). The majority of Risso's dolphin sightings occur in the waters along the west coast of Scotland and in the Outer Hebrides region, however sightings are infrequent, and this species is considered an occasional or seasonal visitor to the region (Calmac, 2020 and HWDT, 2018). Risso's dolphin is a designated feature of the North East Lewis NCMPA.
- Killer whales are found in every ocean throughout the world and are the most widely distributed of the cetacean species (NOAA, 2023). Within the waters of the Outer Hebrides, killer whales are considered seasonal or occasional visitors to the region (HWDT, 2018). The West Coast Community, considered a

resident group of killer whales around western Scotland, appears to have declined to possibly only two individuals remaining.

- Long-finned pilot whales are found in the cool temperate waters of the southern hemisphere and the North Atlantic Ocean, preferring the deep waters of offshore environments, however individuals have been sighted in the shallow waters of coastal areas in some regions (WDC(d), 2023). Strandings of long-finned pilot whales have been recorded within the Outer Hebrides region (Evan and James, 2017).

The distribution, density, and abundance of the eight most common cetacean species occurring in the Outer Hebrides region is described in Table 3-2.

*Table 3-2 Population Parameters of Cetacean Species Potentially Present in the Outer Hebrides Marine Region**

Species Name	Estimated Density Across the Area (individuals/km^2) (Hammond *et al.*, 2021)	Estimated Abundance within the Area (260 km^2)	Management Unit (MU) / Biogeographical Population Estimate (IAMMWG, 2022)	Proportion of the MU Potentially Affected by Activities
Harbour porpoise	0.397	103.2	24,305	0.4%
Bottlenose dolphin	0.0032	0.8	45	1.8%
Minke whale	0.0204	5.3	10,288	0.05%
Common dolphin	0.133	34.6	57,417	0.06%
Killer whale	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*
Risso's dolphin	0.1923	50.0	8,687	0.6%
White-beaked dolphin	0.053	13.8	34,025	0.04%
Long-finned pilot whale	0.0025	0.65	*Insufficient data*	*Insufficient data*
** Density estimates are taken from SCANS-III survey Block I, or from Block H or J if unavailable*				

Potential Impacts

Noise emissions constitute the greatest potential risk to cetacean species within the Outer Hebrides Marine Region. Noise has the potential to impact cetacean species (see Section 1.4.3) and other marine species in two ways:

- Injury – physiological damage to auditory or other internal organs.
- Disturbance (temporary or continuous) – disruptions to behavioural patterns, including but not limited to: migration, breathing, nursing, breeding, foraging, socialising and/or sheltering. This impact factor does not have the potential to cause injury.

If an underwater sound profile is composed of frequencies which lie outside the estimated auditory bandwidth for a given species, then the potential for auditory impact is considered to be very unlikely (NOAA, 2018). To understand

the potential for noise-related impacts, the likely hearing sensitivities of different marine mammal hearing groups has been summarised in below in Table 3-3.

To determine the potential for sound impacts to cetaceans and pinnipeds, predicted sound emission levels are compared to the best available information empirically estimated thresholds for injury and disturbance. Several threshold criteria and methods for determining how sound levels are perceived by marine mammals are available (e.g., the decibel hearing threshold (dBht) method and other hearing weighted and linear measures) and each has its own advantages and disadvantages. Scottish Government (2020) guidance recommends using the injury and disturbance criteria proposed by Southall et al., (2007), which is based on a combination of linear (un-weighted) peak Sound Pressure Levels (SPL) and weighted Sound Exposure Levels (SEL). Since the publication of this paper (Southall et al., 2007), an increasing body of evidence has emerged on marine mammal auditory abilities in novel species and well-researched species alike (e.g., harbour porpoise) which has led to amendments to the auditory thresholds for injury (National Marine Fisheries Service (NMFS), 2018; Southall et al., 2019). In accordance with recent regulator feedback, these amended hearing groups and thresholds for acoustic injury have been adopted herein; they are detailed in Table 3-3.

If a noise emission is composed of frequencies which lie outside the estimated auditory bandwidth for a given species, then disturbance is unlikely. However, noise sources which are sufficiently high can still cause physical damage to hearing and other organs, even when the frequencies lie outside an animal's auditory range. To understand the potential for noise-related impacts, the likely hearing sensitivities of different cetacean hearing groups has been summarised below in Table 3-3. Section 3.4 assesses the potential for injury to be incurred for each hearing group, given their estimated auditory bandwidth and the source frequencies of the technology to be deployed.

Table 3-3 Auditory Bandwidths Estimated for Cetaceans (Southall et al., 2019; NMFS, 2018)

Hearing Group	Estimated Auditory Bandwidth
Low-frequency cetaceans (LF): (e.g. baleen whales, such as humpback whales, minke whales, sei whales, etc.)	7 Hz to 35 kHz
High-frequency cetaceans (HF): (e.g. dolphins, toothed whales, beaked whales and bottlenose whales)	150 Hz to 160 kHz
Very high-frequency cetaceans (VHF): (e.g. marine mammal species such as harbour porpoises and other 'true' porpoises)	275 Hz to 160 kHz
Phocid carnivores in water (PW): (e.g. earless or 'true' seals, such as grey and harbour seals)	75 Hz to 100 kHz

3.2.2 Pinnipeds

Two pinniped (seal) species regularly occur in the Scottish offshore and coastal environment: grey seals and harbour seals. Both grey and harbour seals are listed under Annex II of the EU Habitats Directive and are Protected Marine Features (PMFs). Approximately 36% of the world's grey seals breed in the UK (of these, 81% breed at colonies in Scotland with the main concentrations in the Outer Hebrides and in Orkney). Approximately 32% of the world's harbour seals are found in the UK, however, this proportion has declined from approximately 40% in 2002. Harbour seals are widespread around the west coast of Scotland and throughout the Hebrides and Northern Isles (Special

Committee on Seals (SCOS), 2021). Seal haul-outs are terrestrial sites designated for the protection of seals during vulnerable haul-out periods, such as breeding and pupping. The extent of this protection is limited to those seals on shore at the haul-out. The conservation regulations covering the protection of grey and harbour seals in UK waters include the Marine (Scotland) Act 2010 and the Conservation (Natural Habitats, &c.) Regulations 1994. The undisturbed coastlines of the west coast of Scotland make excellent habitat for haul-outs, which is why several designated seal haul-outs can be found in this region, as shown in Figure 3-1 and

The pupping season of harbour seals is mid-June to July with moulting occurring in August. Grey seals breed between October and December and then moult until early April (SCOS, 2018). Seals haul out onshore for several important life events (i.e., breeding, pupping and moulting.) and to rest between foraging excursions (Pollock, 2000). Both harbour and grey seals are associated with shallower shelf waters, however grey seals are known to make longer foraging trips to deeper waters than harbour seals.

The pupping season of harbour seals is mid-June to July with moulting occurring in August. Grey seals in Scotland pup thereafter from August/September through to December and then moult until early April (Bowen, 2016; SCOS, 2021). For the west coast of Scotland, pupping is generally September through to October and moulting generally November through to December.

Similar to seabirds, seals are central-place foragers, utilising a terrestrial 'base' for important life history events (i.e., breeding, pupping, moulting, etc.) and to rest, and then undertake foraging trips at sea before returning to land (Pollock, 2000). While both species are associated with shallower shelf waters, grey seals often make longer foraging trips to deeper waters than harbour seals.

Carter et al (2022) modelled the habitat preference of grey and harbour seals, and predicted at-sea seal distribution on a 5 km x 5 km grid for both species. These data have been processed according to the method described in SCOS (2021), utilising scalars to generate estimates of number of seals within each grid cell (and 95 % confidence limits). This is calculated by scaling the Carter et al (2022) relative density in a cell to an absolute at-sea seal density (mean numbers of seals per cell) using the most recent independent estimate of the grey or harbour seal population and the proportion of the population at sea at a given time. In line with this, the mean predicted absolute abundance of grey and harbour seals per 25 km2 is shown in Figure 3-1 and Figure 3-2.

The estimated at-sea usage of both grey and harbour seals throughout the Outer Hebrides region is between 0 – 200 per 25 km^2 (Carter *et al.*, 2022). The at-sea distribution of harbour seals is higher in the Sea of the Hebrides when compared to the mean at-sea distribution of the species across the wider west of Scotland region. The grey seal at sea-distribution is highest in the waters off the west of Harris, North Uist and Benbecula, with a hot spot in the waters around the Monach Isles and northwest Barra when compared to the mean at-sea distribution of the species across the wider west of Scotland Region (Carter *et al.*, 2022).

There are 27 seal haul-out sites across the Outer Hebrides region, with the majority of these sites concentrated around the coasts of North and South Uist (Marine Scotland, 2022).

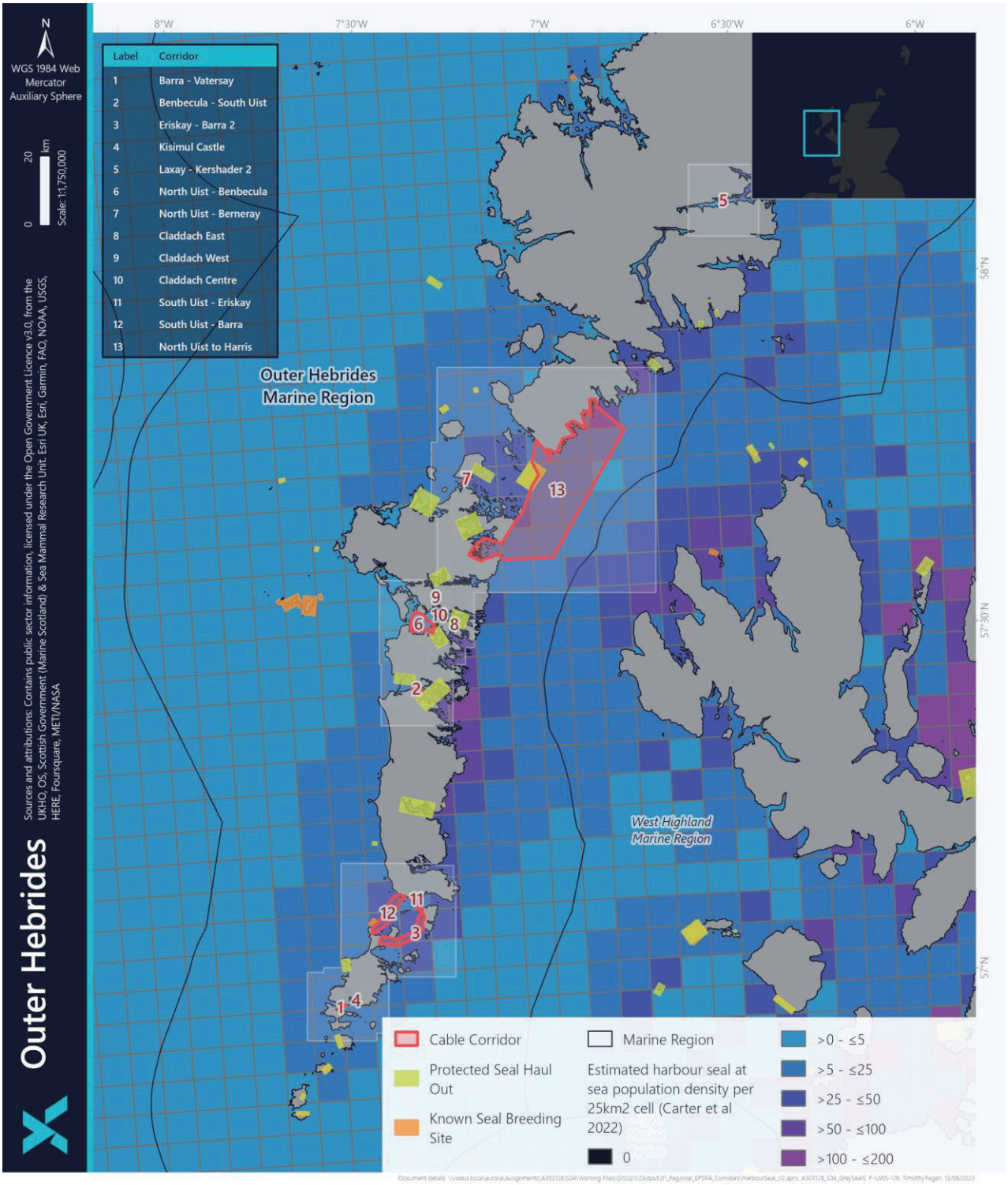


Figure 3-1 Estimated Harbour Seal Density (Carter et al. 2022)

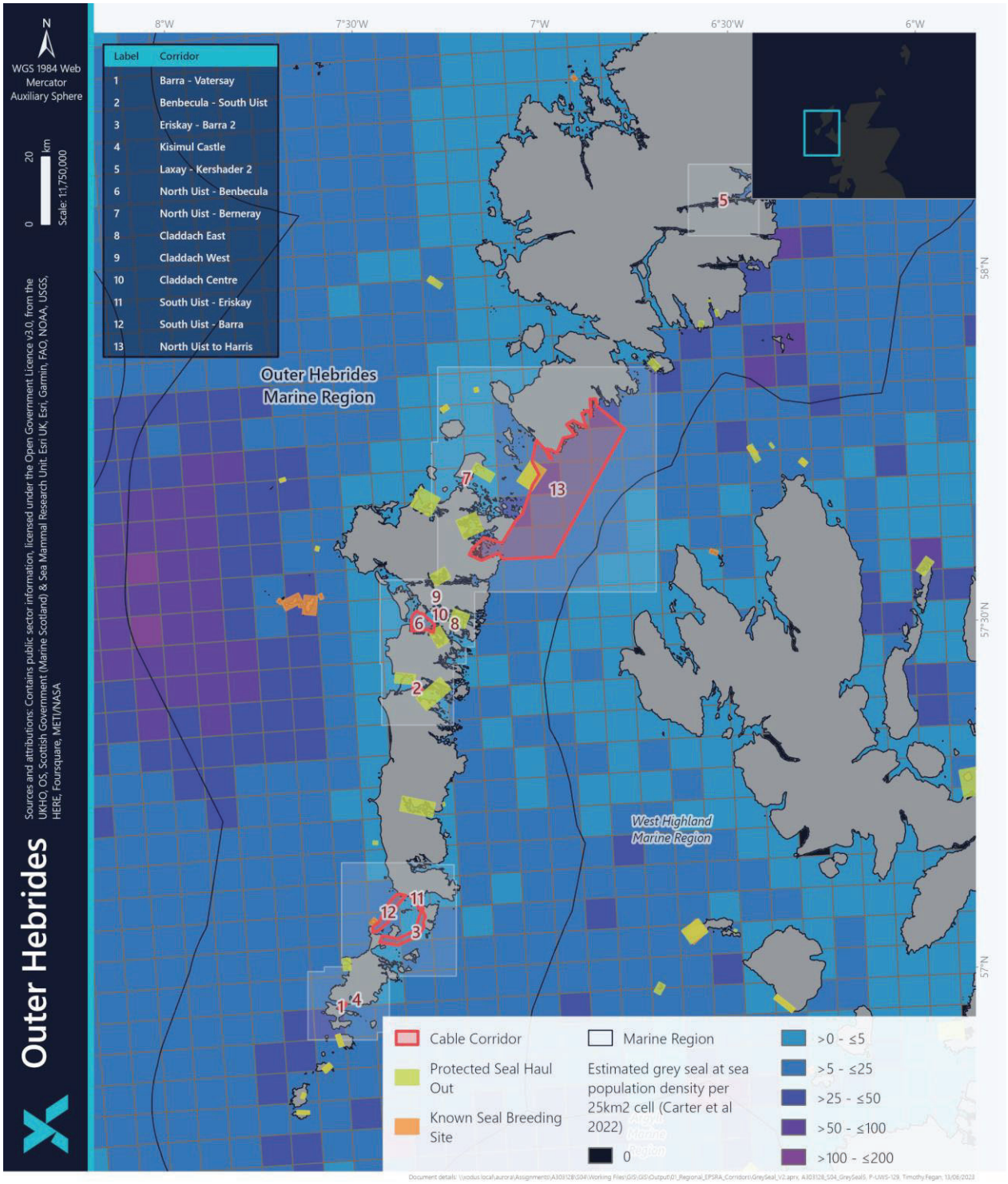


Figure 3-2 Estimated Grey Seals Density (Carter et al. 2022)

Potential Impacts

Potential impacts from the testing and collaboration of equipment and geophysical surveys may arise from underwater noise generated during survey activities and physical disturbance at haul-out sites (i.e., from vessel or human presence), as outlined in Table 3-1. Seals are particularly susceptible to project-related impacts during their respective pupping and moulting seasons, when the residency of seals at haul-outs and in surrounding waters elevates the relative density of each species.

Underwater sound emissions have the potential to cause physical injury or disturbance to seals, particularly if they fall within their generalised hearing range of 50 Hz to 86 kHz (NMFS, 2018). However, contemporary data suggests that even with very intense sound emissions, such as those from pile driving activity, harbour seals are likely to return to the region of the sound source once the emissions have ceased (Russell et al., 2016). Where this leads to an animal avoiding their main feeding and breeding grounds this can have longer term effects on the health and breeding ability of that animal (Kastelein et al., 2006).

Any underwater sound emissions resulting from the survey activities will not result in the killing of seals, for which the two species are protected (see Section 1.5.3) and no further assessment of underwater noise in this respect is conducted. Furthermore, the only other protection for seals is against disturbance at haul-outs, which will not occur from underwater sound (since the emissions are, by definition, not airborne). On this basis and considering also the mitigation measures to be adopted for the project (Section 5), no further assessment of underwater sound is made for seals. As seals are specifically protected from disturbance at designated haul-outs, this has been considered in Section 4.

3.2.3 Otters

The Eurasian otter are listed in Annex IV of the Habitats Directive as EPS. They are small, semi-aquatic mammals which inhabit riverine, brackish and coastal environments throughout the United Kingdom (UK). Although land mammals, otters depend on both freshwater and marine environments for food. Their marine habitat comprises low, peat-covered coastlines with shallow, seaweed rich waters and a consistent freshwater supply (Department of Energy and Climate Change (DECC), 2016).

Potential Impacts

There is the potential for otters to be present at some of the cable landfall locations during geophysical survey activities. Otters may be disturbed by the presence of vessels but do not display a particular sensitivity to noise. Each cable route survey will be undertaken over a short period of time within the nearshore area adjacent to the cable landfall locations (i.e., for a period much shorter than the overall survey period of the cable route), and therefore any disturbance will be temporary. Therefore, no adverse effects to otters are anticipated.

As part of proposed onshore works, it may be a requirement to commission otter surveys in consultation with NatureScot. Any further licensing requirements will be informed by the outcome of these surveys and subject to separate licensing at the appropriate time. Fundamentally, as there is the potential for some level of disturbance to otters as a result of onshore works, SHEPD will adopt appropriate mitigation measures (as outlined in Section 5).

3.3 Other Protected Species

3.3.1 Basking Sharks

Basking sharks are one of the largest fish species in the world and are one of only three shark species which filter feed (Sims, 2008). Basking sharks are widely distributed in the cold and temperate waters throughout the UK, with frequent sightings noted in the waters around the south-west of England, Wales, the Isle of Man and the west coast

of Scotland (TWT, 2023) and predominantly feed on plankton and zooplankton (e.g., barnacles, copepods, fish eggs and deep-water oceanic shrimps) by filter feeding large volumes of water through their large mouth. Basking sharks are, by nature, slow-moving species (around 4 miles per hour). In the winter, they dive to great depths to feed, while in summer they are mostly spotted in the warmer waters near the surface.

Up until 1995, basking sharks were hunted in UK waters however they are not protected in UK waters under Schedule 5 of the Wildlife and Countryside Act 1981, the Nature Conservation (Scotland) Act 2004 and are classified as Scottish Priority Marine Features (PMFs). Basking sharks are also listed as threatened and declining species on the OSPAR list. Due to their size, slow swimming speed and preference for warmer coastal waters during the summer months, basking sharks are considered to demonstrate a potential collision risk for with Project vessels. In addition, given their long gestation period and slow maturity period, the species can be slow to recover is the species are rapidly depleted.

Basking sharks are seasonal visitors to Scottish waters, arriving in spring and leaving in autumn. Basking sharks breed in the summer months, with peak densities recorded along the west coasts of Scotland in August (Witt *et al.*, 2012), with NMPi (2023) reports recording regular sightings of basking sharks throughout the Outer Hebrides region.

Potential Impacts

The basking shark is an elasmobranch (sharks and rays) which is a group with generally low sensitivity to sound pressure due to the fact they do not have a swim bladder. The hearing range of basking sharks is not known; however, five other elasmobranchs have been found to have a hearing range between 20 Hz to 1 kHz. However, this may or may not be transferable to basking sharks (Macleod *et al.*, 2011). As 20 Hz – 1 kHz only encompass a small proportion of the sound profiles emitted during the proposed geophysical surveys, and considering the temporary nature of activities, acoustic disturbance is not expected to impact basking sharks. On this basis, the potential for underwater noise emissions to impact upon basking sharks is screened out of further assessment.

Vessel collision also poses a threat to this slow-moving species. Collision risk increases with increasing vessel speed. As the survey vessels will be slow-moving during the survey campaign, collision risk is low. Risk will be reduced further on the basis of mitigation measures that SHEPD introduce (as outlined in Section 5).

3.3.2 Birds

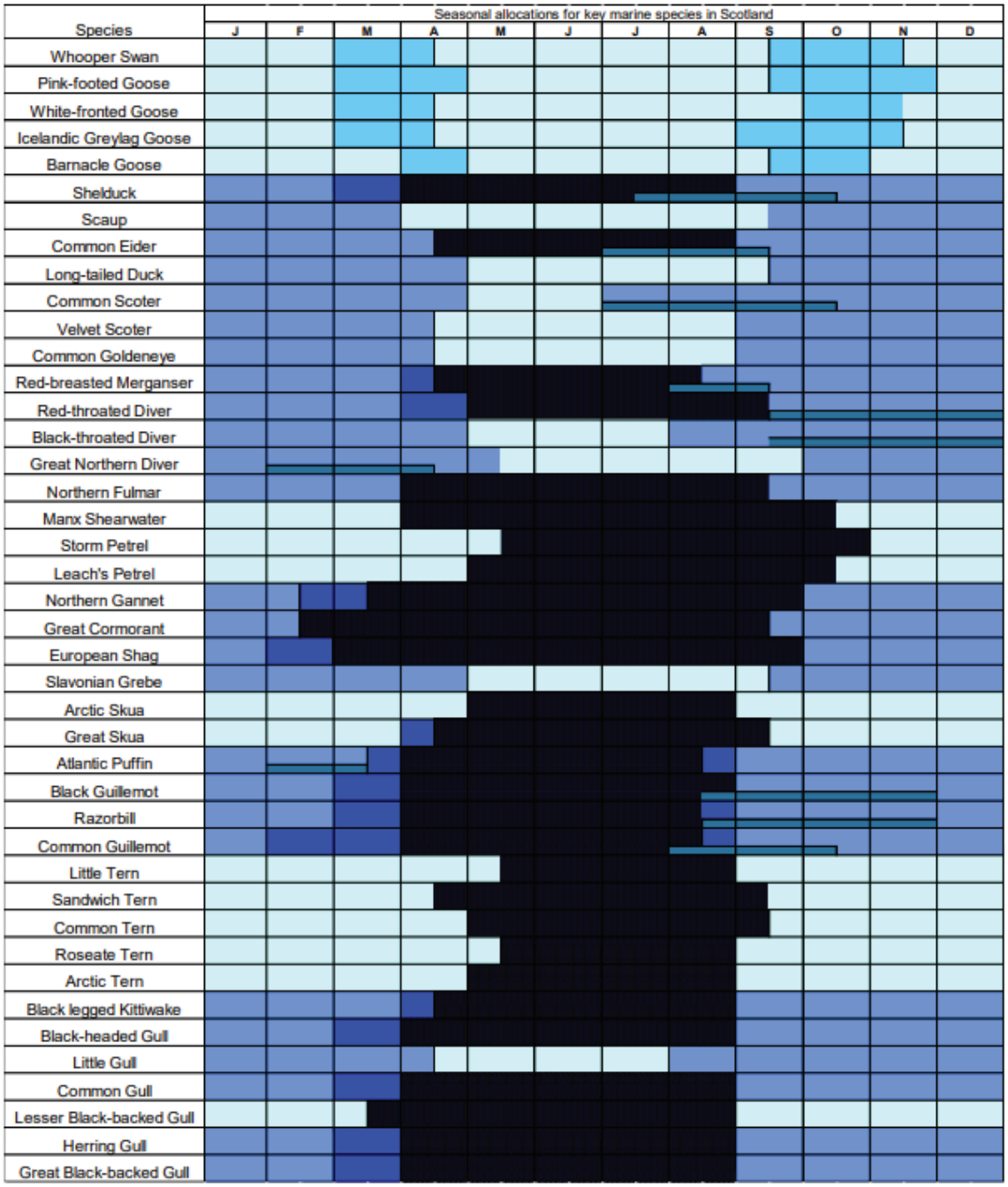
The primary legislation for the protection of birds is the WCA in combination with the Nature Conservation (Scotland) Act 2004. Under these acts, it is an offence to harm wild bird species, their eggs and nests. Additional protection is provided for certain bird species listed on Schedule 1 of the WCA, and it is an offence to disturb those species at their nest while it is in use.

The Scottish coastal and marine environment forms vital habitat to a variety of seabird species. The west coast of Scotland hosts some particularly important cliff and island habitat for nesting seabirds. While the marine environment forms important habitat to seabirds year-round, birds are most vulnerable to human disturbance at sea during the moulting period when many species become flightless and spend greater time on the sea surface (Pollock *et al.*, 2000). After the breeding season ends, moulting birds disperse from their coastal colonies to head to offshore waters. This at-sea period increases the likelihood of interactions with survey vessels and potential collision risk. The important life-history periods for seabird species found in Scotland's waters are shown in Table 3-4.

In addition, there are several species of seabird, shorebird and water fowl (e.g. ducks) for which Special Protection Areas (SPA) are designated under the requirements of the EU Birds Directive. These SPAs protect key areas for certain species at specific times of the year, e.g. breeding colonies or important foraging areas.

White-tailed (sea) eagle Haliaeetus albicilla is not a feature of any SPAs, but could be sensitive to disturbance in coastal areas where it forages. The sensitive time period for white-tailed eagle is from mid-February to late August (SNH, 2014).

Table 3-4 Breeding Season and Nest Occupancy of Seabirds in Scottish Waters (NatureScot, 2020)



Breeding period (strongly associated with nest site)	
Breeding site attendance (not closely associated with nest site)	
Migration Period (birds in marine environment only on active passage)	
Flightless moult period	
Winter period (non-breeding)	
Not present in significant numbers (in Scottish marine areas)	

Potential Impacts

During the proposed activities, the physical presence of vessels may cause disturbance to birds in Outer Hebrides Marine Region. The presence of vessel lighting also has the potential to disorientate fledgling birds, leading to collisions with vessels which may be fatal (Rodriguez *et al.*, 2015). The proposed project activities have the potential to take place at any point between the 1st October 2023 and 30th September 2028, and therefore have the potential to coincide with the sensitive breeding and moulting periods for birds.

Despite the potential overlap between the proposed activities and sensitive periods for birds which utilise the marine environment, the short-term and temporary nature of the activities, and their limited spatial extent, restrict the potential for introducing significant impacts to birds in the Outer Hebrides Marine Region. Finally, vessels will be travelling slowly and in a predetermined pattern over the course of the surveys. Considering that the seabirds are protected by legislation from harm to individuals, eggs, and nests, no further assessment is conducted herein since these impacts will not occur from the project activities.

Impacts on designated conservation sites with seabird features (e.g. SPAs) are considered below in Section 4, and mitigation to control impact on sites protected for seabirds is detailed in Section 5.

3.4 Underwater Sound Impact Assessment on Protected Species

3.4.1 Protected Species Assessment Criteria

Injury

NOAA (2018) defined two different types of sound that have the potential to result in acoustic injury:

1. Impulsive: sound which are short in duration (i.e., less than 1 second long) and temporary, occupy a broadband width, and have rapid rise and decay times with a high peak pressure level; and
2. Non-impulsive: sound which may occupy a broadband, narrowband or tonal bandwidth, can be brief, prolonged, continuous or intermittent in nature. These sounds are not characterised by rapid rise and decay times or high peak pressure levels.

The geophysical surveys comprise acoustic equipment which emit multiple pulsed sounds. The Scottish Government (2014) guidance recommends assessment of acoustic impacts based on thresholds for acoustic related injury to marine mammals (as identified by Southall *et al.* (2007)). These injury thresholds have since been amended with contemporary acoustics data on marine mammal auditory abilities, as described in the technical note by NOAA (2018) and in Southall *et al.* (2019). For this reason, the underwater noise impact assessment presented herein considers contemporary noise impact thresholds as best practice (as advised by NatureScot).

The sound profile emitted from the equipment listed above in Table 2-4 will disperse through the water column, with sound pressure generally reducing as distance from the noise source increases. For this reason, marine mammals will be exposed to a lower sound pressure level further from the noise source. Therefore, for the survey equipment with potential to cause injury to marine mammals, the dispersion of sound through the water column has been modelled

to assess the appropriate mitigation zone in which the sound pressure levels received by marine mammals are reduced below potentially injurious levels.

A dual-metric approach has been adopted which identifies the range of potential injury to marine mammals from both the peak sound pressure level (SPLpk;) and cumulative sound exposure level (SEL) for each equipment type identified to require consideration for noise-related injury (see Table 3-1). The thresholds above which each marine mammal hearing group may experience acoustic injury are presented in Table 3-5. These thresholds are derived from measurements of marine mammal hearing using weighting functions which account for peak hearing abilities for each hearing group (NOAA, 2018).

Table 3-5 Criteria Considered in this Assessment for the Onset of Injury in Marine Mammals from Impulsive Sound (NOAA, 2018; Southall et al., 2019)

Marine Mammal Hearing Group	Impulsive Sound		Non-Impulsive Sound
	Peak pressure (dB re 1 µPa)	Cumulate SEL (dB re 1 µPa^{2}s)	Cumulate SEL (dB re 1 µPa^{2}s)
Low-frequency (LF) cetaceans	219	183	199
High-frequency (HF) cetaceans	230	185	198
Very high-frequency (VHF) cetaceans	202	155	173
Phocid pinnipeds (underwater)	218	185	201

Disturbance

Disturbance Regulations

There are two regulations which govern disturbance to EPS: Regulation 39(1) and Regulation 39(2). Regulation 39(1) from the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) defines disturbance for all EPS in UK waters and individuals which are vulnerable to disturbance due to biological or environmental circumstances. Regulation 39(2) (for which comparable offence is not found in offshore waters, or in English or Welsh inshore waters) goes beyond the disturbance guidelines provided in Regulation 39(1) by making it an offence to deliberately or recklessly disturb any cetacean in Scottish Territorial Waters (i.e., up to 12 NM) (Scottish Government, 2020). The definitions of disturbance are provided in Box 1 below.

Box 1 Disturbance Regulations in Scottish Territorial Waters

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

Regulation 39 (1) makes it an offence —

(a) deliberately or recklessly to capture, injure, or kill a wild animal of a European protected species;

(b) deliberately or recklessly –

(i) to harass a wild animal or group of wild animals of a European protected species;

(ii) to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;

(iii) to disturb such an animal while it is rearing or otherwise caring for its young;

(iv) to obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place;

(v) to disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;

(vi) to disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; or

(vii) to disturb such an animal while it is migrating or hibernating.

Regulation 39(2) provides that it is an offence —

to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean).

To consider the possibility of a disturbance offence resulting from the proposed survey, it is necessary to consider the likelihood that survey activities would generate a non-trivial disturbance based on the sensitivity of the species present. Where there is a possibility of disturbing an individual animal, it is necessary to apply for a Marine EPS Licence to ensure that an offence is not committed. However, in issuing a Marine EPS Licence, Marine Scotland must consider whether the FCS of any species will be affected. Consequently, the impacts of proposed activities on the FCS of all protected species must be considered to satisfy both Regulation 39(1) and 39(2). The impact assessment below addresses the impacts of survey activities on the existing conservation status of protected species within the area.

Acoustic Disturbance Criteria

Auditory thresholds for disturbance, as defined by NMFS (2014), coupled with behavioural response criteria detailed in Southall et al. (2007) have been adopted for the assessment of potential marine mammal disturbance from both non-impulsive and impulsive sound sources. These thresholds, which utilise the behavioural response severity scale detailed in Southall et al. (2007) for grading the strength of behavioural responses, are provided in Table 3-6 below.

Table 3-6 Disturbance Threshold Criteria for Impulsive and Non-Impulsive Sounds (Southall et al., 2007)

Behavioural Effect	Threshold Criteria SPLrms
Potential strong behavioural reaction (6 or more on the severity scale)	160

3.4.2 Acoustic Impact Assessment

Sound propagation modelling approach

Underwater sound propagation modelling has been undertaken to identify the potential range (i.e. the straight-line distance from the source) in which acoustic impacts to marine mammals could occur. The dual-metric modelling approach recommended by NOAA (2018) has been used to identify impacts from: (1) the SPL reported as the root-mean-square (rms) pressure level (SPLrms); and (2) the cumulative SEL. The SEL represents the total energy produced by a sound-generating activity standardised to a one-second interval. This enables comparison of the total energy attributed to different activities with different inter-pulse intervals. As described above, empirically-derived weighting

functions (NOAA, 2018; Southall et al., 2019) have been applied to the modelling outputs to account for peak hearing sensitivity for the respective marine mammal hearing groups.

The following assumptions have been applied to the models:

- Maximum SPL_{rms} has been used for all calculations.
- Maximum pulse lengths and minimum turn around have been used where provided.
- Where sources frequencies occur across a range of frequencies, a flat 1/3-octave spectrum has been used.
- Where data is unavailable, the time between sound pulses have been calculated as 1.5 times the ping length.
- Mammals swim at seabed depths (this represents the worst-case scenario).
- Vessels are moving at slow speeds.
- Survey equipment used in the nearshore, shallow water environment (i.e., <10 m) will likely operate at a very high frequency to provide for better resolution and will operate at a lower SPL, therefore this does not constitute a worst-case scenario.

It is important to note that the rms value associated with the SPL_{rms} depends upon the length of the integration window used. Using a longer-duration integration window with an impulsive sound source generally results in a lower rms than produced by a shorter integration window.

An acoustic phenomenon results from the elongation of the waveform with distance from the source due to a combination of dispersion and multiple reflections. Measurements presented by Breitzke et al. (2008) indicate elongation of the T90 window up to approximately 800 m at 1 km. This temporal "smearing" reduces the rms amplitude with distance by elongating the rms window, which has been included within the disturbance modelling scenarios. Since the auditory organs of most marine mammals considered within this assessment integrate low frequency sounds over an acoustic window of around 200 milliseconds (ms) (Madsen et al., 2006 and references therein), this duration was used as a maximum integration window for the received SPL_{rms}.

The directional characteristics of sound are also an important factor affecting the received sound pressure levels from sound-generating activities. In geophysical surveys, sound source arrays are designed so that the majority of acoustic energy is directed downwards towards the ocean floor for data collection purposes. As such, the amount of energy emitted across the horizontal plane is significantly less (≥ 20 dB) than the amount of energy emitted downwards. Due to the frequency-dependent nature of sound, the loss of pressure on the horizontal plane is more pronounced at higher frequencies than at lower frequencies. Directional corrections can be applied to the model outputs, which provide broadband normalised amplitudes at varying angles of azimuth[1] and dip angle[2]. Directivity corrections have been applied to the modelling outputs under the assumption that the animal is directly in-line with the vessel (i.e. at the 0º azimuth).

Injury Impacts

For the proposed surveys, the expected frequency range for USBL, SBP and MBES operations overlaps with the hearing range of all cetacean hearing groups (Table 3-3). Potential injury to cetaceans (i.e., injury which results from a permanent threshold shift in hearing abilities) is limited to impulsive sound sources which exceed the injury thresholds defined in Table 3-5.

Modelling of ranges at which injury impacts are likely to result from deployment of survey equipment has been undertaken. The exception to this is for the MBES Kongsberg EM710 equipment which has not been modelled,

[1] The azimuth is taken as the angle of circumference around the boat which lies parallel to the surface of the water, progressing around the boat from port to starboard.
[2] The dip angle is taken as the angle under the boat, progressing from prow to stern.

however, specific mitigation characteristics of this equipment have been considered and qualitatively risk assessed. Examples of survey equipment have been selected to exemplify the worst-case scenario for each survey technique, including the greatest SPLs across source frequencies meant to encapsulate the hearing abilities of all representative hearing groups. Impacts from noise sources which are strictly behavioural in nature (i.e., disturbance impacts) are covered in the subsection below.

Table 3-7 Noise Modelling Results for Injury Impacts from Impulsive Sound Sources (N/E = no exceedance of thresholds)

Activity	Example Equipment Modelled	Depth (m)[3]	Frequency (kHz)	SPLrms (dB re 1µPa)	Injury range (m)											
					Cumulative SEL (Static Mammals)				Cumulative SEL (Moving Mammals)				Peak SPL			
					VHF	HF	LF	PW	VHF	HF	LF	PW	VHF	HF	LF	PW
USBL	1000 Series Mini Beacon, Applied Acoustics Underwater Technology	100	24 - 33.5	200	104	98	73	86	104	56	36	44	24	6	11	11
		10	24 - 33.5	200	12	11	11	11	12	11	11	11	36	10	16	17
SBP/ SSS	EdgeTech 2000 series, combined side scan and sonar and sub-bottom profiling system[4]	100	0.5 - 12	230	40	38	38	38	38	38	38	38	61	3	8	9
		10	0.5 - 12	230	5	4	4	4	5	4	4	4	73	4	13	15
SBP	Innomar SES 2000 sub-bottom profiler, 4 kHz	100	4	235	9	5	9	9	9	5	6	5	255	28	68	73
		10	4	235	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	445	98	178	188
	Innomar SES 2000 sub-bottom profiler, 100 kHz	100	100	235	28	17	17	17	19	17	16	17	30	12	17	18
		10	100	235	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	29	11	16	17

[3] Depth refers to depth below the survey activity, which has been assumed to be hull-mounted or towed at the surface. These depths have been identified as representative of the nearshore and offshore depths in which surveys are likely to occur across the project area, based on available bathymetry data.

[4] For modelling purposes, the specifications of the 2000-CSS have been used.

All survey technologies emitting impulsive sound that have been modelled as part of the assessment have the potential to cause injury to EPS and other marine mammals (Table 3-5; Table 3-7). As such, survey activities associated with the Project may be potentially injurious to EPS species without appropriate mitigations.

Across modelling scenarios and metrics, the injury ranges were generally highest for the VHF hearing group (Table 3-7), which is represented by harbour porpoise in UK waters. Conversely, HF cetaceans seemed to constitute the hearing group with the lowest potential impact ranges for the peak SPL metric, while LF cetaceans had the lowest impact ranges for the cumulative SEL metric, when comparing between activity types (Table 3-7).

High frequency sounds attenuate more quickly than lower frequency sounds such that an animal would need to be much closer to the sound source for it to cause acoustic injury. For this reason, injury ranges were of the order of metres to tens of metres for the SBP operating at 100 kHz. The deployment of hull-mounted USBL in 100 m depths elevated the potential range of impact to a maximum of 104 m (cumulative SEL) for VHF cetaceans. However, the likelihood of a cetacean being this close to operational equipment is extremely unlikely when considering that the source is deployed from a moving vessel travelling at more than 2 ms 1 (i.e., 4 knots) and, in some cases, is being towed at depth (e.g., a USBL may be mounted on a towed device within a few metres of the seabed).

The greatest potential for injury to a cetacean resulted from the low frequency (i.e., 4 kHz) sounds emitted by the SBP during shallow water operations (i.e., 10 m), where refraction off the seabed could cause almost immediate cylindrical spreading of sound emissions, causing the sound to rapidly travel farther along the horizontal plane of the water column. Furthermore, when considering the directionality of the survey equipment (i.e., downwards towards the seabed), the vast majority of acoustic energy is contained an angle of approximately 45° from the source (the slant height of the conical noise source) to maximise penetration and the resultant imagery. Animals would need to be at the seabed below the sound source to experience the sound pressure levels behind the modelled impact ranges.

The majority of injury ranges were slightly reduced when considering animal movement during the cumulative SEL estimation. Swim speeds of the species most likely to be observed in the area have been shown to be several ms- 1 (e.g. cruising minke whale swim speed is 3.25 ms-1 and harbour porpoise may swim up to 4.3 ms-1) (Blix and Folkow, 1995; Otani et al., 2000). Further, SNH (2016) has provided standard values for mean swimming speeds of various marine mammal species likely to occur in the project area, including harbour porpoise (1.4 ms-1; Westgate et al., 1995); harbour seal / grey seal (1.8 ms-1; Thompson, 2015); and minke whale (2.1 ms-1; Williams, 2009). To offer a representative model of the predicted noise exposure ranges of marine mammals moving away from the sound source, a conservative mean swim speed of 1.5 ms-1 has been used in the calculations. Considering that the surveys themselves will take place while the vessel is moving, the cumulative SELs of all equipment types are expected to be lower than predicted based on the premise that animals are likely to move away from the mobile sound source, opposite to the direction of vessel travel.

It should also be noted that the modelling scenarios presented as part of this assessment are meant to define the worst-case injury ranges associated with the deployment of the project's survey equipment. The in-situ deployment of the sound-generating survey equipment will most frequently occur in waters of intermediate depths (i.e., between 10-100 m). Moreover, the frequency ranges depicted constitute the lowest and highest reasonably practicable settings for the survey activities modelled, meaning that the spread of sound in the marine environment is also likely to be less than those defined by the modelled outputs, thereby the impact ranges associated with the low frequency survey equipment presented in this assessment are likely to be conservative estimates.

Available mitigation measures specifically designed for geophysical surveys (JNCC, 2017) have been incorporated into mitigation measures described in Section 5.2 below. These measures include deployment of a Marine Mammal

Observer (MMO) to monitor for the presence of cetaceans within a 500 m mitigation zone prior to the commencement of, and during, any SBP surveys (JNCC, 2017).

In consideration of the relevant mitigation measures, none of the modelled scenarios indicate any potential for injury to cetaceans outside this 500 m mitigation zone. As EPS and other marine mammal species would need to occur and remain within 500 m of the moving vessel or vehicular platforms from which the survey equipment will be deployed, injury to EPS from survey activities is highly unlikely once these mitigation measures have been applied. For these reasons, the proposed survey activities are not anticipated to result in a potential impact that would impair or impede the survival or reproductive capabilities or result in any other significant impacts to the FCS of any EPS present within the Outer Hebrides Marine Region.

Disturbance Impacts

In addition to physical injury, sound emissions have the potential to result in behavioural disturbance of cetacean species within the vicinity of the sound source. Significant or strong disturbance (Table 3-6; Southall *et al.*, 2007) may occur when an animal is at risk of a sustained of chronic disruption of behaviour or habitat use, which could result in a population-level effect. An assessment of potential disturbance impacts as a result of impulsive and non-impulsive sound is provided in the Sections below. The outputs of the noise modelling assessment against cetacean disturbance thresholds are provided in Table 3-8.

Table 3-8 Sound Modelling Results for Disturbance Impacts from Impulsive Sound Sources

Activity	Example Equipment Modelled	Depth (m)	Frequency (kHz)	SPLrms (dB re 1µPa)	Range of Behavioural Change (m)
USBL	1000 Series Mini Beacon, Applied Acoustics Underwater Technology	100	24 - 33.5	200	182
		10	24 - 33.5	200	207
Combined SBP/SSS	EdgeTech 2000 series, combined side scan and sonar and sub-bottom profiling system[5]	100	0.5 - 12	230	3,250
		10	0.5 - 12	230	2,750
SBP	Innomar SES 2000 sub-bottom profiler, 4 kHz	100	4	235	4,220
		10	4	235	3,120
	Innomar SES 2000 sub-bottom profiler, 100 kHz	100	100	235	125
		10	100	235	120

Three types of survey activities have the potential to result in behavioural disturbance in EPS (i.e., a disturbance offence) as described above. These activities are: USBL; combined SBP/SSS; and SBP. The potential for a disturbance offence to result from these types of technology varies between activity type, though, the predicted disturbance range is much greater for the low frequency sound sources which travel farther within the marine environment. The

[5] *For modelling purposes, the specifications of the 2000-CSS have been used.*

4 kHz sounds emitted by the combined SBP/SSS and the SBP survey have the potential to generate disturbance impacts in the order of several km, whilst those emitted by the USBL are of the order of hundreds of metres (Table 3-8).

The number of individuals which may experience disturbance from the worst-case scenario for each activity type has been calculated and are presented in Table 3-9 below, based on the population parameters provided in Table 3-2. In these calculations, the impact range serves as a radius with which to calculate the total area of coverage for a potential disturbance event associated with each survey activity.

Table 3-9 Number of Cetacean Individuals and Proportion of the MU which may Experience a Disturbance Offence from Impulsive Survey Activities, Based on Known Population parameters of the Most Frequently Occurring Species

Species	Number of Individuals which may Incur a Strong Disturbance			Maximum Proportion of the MU Potentially Affected by Project Activities
	USBL (0.13 km² area)	Combined SBP/SSS (33 km² area)	SBP – 4 kHz[6] (56 km² area)	
Harbour porpoise	0.05	13.1	22.2	0.09%
Bottlenose dolphin	0.0004	0.1	0.2	0.4%
Minke whale	0.003	0.7	1.1	0.01%
Common dolphin	0.02	4.4	7.5	0.01%
Risso's dolphin	0.02	6.3	10.8	0.12%
White-beaked dolphin	0.006	1.7	3.0	0.01%

The source levels associated with the example survey equipment have the potential to elicit a strong behavioural response in EPS which could be classed as a disturbance offence as defined under Regulations 39(1) or 39(2) of the Habitats Regulations (Box 1). However, none of the biogeographical Management Units (MU) for any of the EPS species known to regularly occur within the project area will incur significant impacts. The cetacean species which may experience greatest disturbance impacts from the project activities in the Outer Hebrides Marine Region are bottlenose dolphin and Risso's dolphin, whereby 0.4 % and 0.12 %, respectively, of the biogeographic population could be impacted. For all other species considered, including harbour porpoise, minke whale, common dolphin and white beaked dolphin, less than 0.1% of the biogeographic population will be impacted by acoustic disturbance (Table 3-2). Moreover, less than 0.1% (and in some cases 0.01%) of any cetacean will be potentially disturbed by USBL deployment at any given time, making potential disturbance impacts from this survey equipment negligible.

As the survey vessel will not be stationary during these activities, animals within a particular area will not be exposed to extended periods of underwater noise. Rather, individuals would have to follow the moving equipment to be subjected to lasting or prolonged periods of noise which may have detrimental effects to either the individual or the population (i.e., a significant disturbance).

[6] The Innomar SES 2000 sub-bottom profiler at an operational frequency of 4 kHz has been taken as a worst case.

The programme of geophysical surveys will take place *ad hoc*, with the use of survey technologies and vessels being intermittent therein. There will be periods of inactivity during weather downtime and during geotechnical data collection. Given the transient and short-term nature of the survey and vessel activities, it is highly unlikely that any disturbance offences from use of combined SSS/SBP or SBP would negatively impact upon the FCS of any of the cetacean species which may be present in the survey area. This is on the basis that the modelled level of disturbance is unlikely to affect the ability of any individual animal to survive or reproduce and will not have significant population-level impacts to any EPS (Table 3-9). Regardless, it is possible that a small number of animals may experience some level of disturbance for the short period that they encounter the proposed survey activities. As such, an EPS Licence is expected to be required for the SBP-related survey activities within 12 nautical miles (as per Regulation 39(2)).

Qualitative Assessment: Kongsberg EM710 MBES

No modelling of the Kongsberg EM710 MBES equipment has been carried out. This equipment operates within a frequency range of 70-100 kHz with sound pressure levels in the range of 225- 231 dB re 1 µPa at 1 metre. Given that that these frequencies fall within the hearing range of HF and VHF cetaceans, this specific equipment has the potential to cause injury and disturbance to these cetaceans. The maximum intensity is encountered in a thin wedge extending below the ship with an angular coverage of about 140°. Due to the Marine Mammal Protection Mode feature of the equipment, the intensity level may be lowered by 10 or 20 dB by the operator. The EM710 may also be set in a mode to begin pinging with a flexible soft-start as a possible means of inducing marine mammals to leave the area of high intensity sound.

Injury Impacts

When comparing the specifications of this equipment to those modelled, as a worst case, without the implementation of the protection mode, the equipment would most likely result in injury ranges similar to those modelled for the SBP at 100 kHz, given the equipment characteristics. Higher frequency sounds attenuate more quickly than lower frequency sounds such that an animal would need to be much closer to the sound source for it to cause injury. For this reason, injury ranges were of the order of metres to tens of metres for the SBP operating at 100 kHz and it is considered that injury ranges would be similar with the use of the unmitigated use of the EM710 MBES equipment.

For the mitigated system, whereby, the intensity is lowered by up to 20 dB and soft start is implemented and given the higher frequencies of the equipment and the swath angled nature of the device, it is highly unlikely that injury would occur. This is particularly relevant when considering that the downward angle of the device which effectively would require a cetacean to be directly beneath the equipment in order to induce injury, given the soft-start mitigation this is highly unlikely to occur.

Additional mitigation specifically designed for geophysical surveys (JNCC, 2017) have been incorporated into mitigation measures described in Section 5.2 below. These measures include deployment of an MMO to monitor for the presence of cetaceans within a 500 m mitigation zone prior to the commencement of, and during, any SBP surveys (JNCC, 2017).

In consideration of the relevant mitigation measures, none of the modelled scenarios indicate any injury events are likely to exceed the 500 m mitigation zone. For this reason, the MBES survey activities using the Kongsberg EM710 are not anticipated to impair the ability of an animal to survive or reproduce or result in any significant impacts on the FCS of any individual EPS or EPS population.

Disturbance Impacts

As discussed above, the unmitigated system most similarly compares to the SBP modelled at 100 kHz frequency. The potential for a disturbance offence is much greater for the low frequency noise sources which travel farther within

the marine environment. As such, the range of sounds emitted by the USBL and higher frequency (i.e. 100 kHz) SBP are on the order of a couple hundred metres, which is less than equipment operating at lower frequencies (Table 3-8). Therefore, the unmitigated system would likely result in similar disturbance ranges to that of the SBP (100 kHz) equipment, which shows disturbance in the range of 125 m in offshore locations, resulting in potential disturbance to a maximum of 13.1 individual animals (harbour porpoise) and resulting in all cases to <0.4 % of the biogeographical MUs exhibiting disturbance, resulting in negligible impacts from disturbance.

The mitigated system, as described above, would further reduce disturbance to cetaceans, ensuring no significant impacts on the FCS of any individual EPS or EPS population would occur. The mitigation for this equipment is further discussed in Section 5.

Nearshore Activities

The taxa that are most likely to be impacted by works in the nearshore environment and at landing locations are seals and otters. The potential impacts to these species arise from vessel presence and survey activities. Geophysical survey activities within the intertidal zone have the potential to result in disturbance to protected species with varying consequences.

- Seals – although they occupy the marine environment for the majority of the year, grey and harbour seals do utilise the coastal environment during their most sensitive life-history periods; breeding, pupping and moulting. They form breeding colonies and haul-outs for these purposes along rocky, often remote coastlines around the UK, though sometimes colonies may extend onto sandbanks and up cliffs (Nordstrom, 2006). Disturbance at these important terrestrial habitats through vessel presence has the potential to cause acute distress, which may lead to individuals vacating the site and returning to water. This intentional or reckless disturbance at a haul-out site constitutes an offence under the Marine (Scotland) Act 2010. At pupping sites, behavioural responses to stressors has the potential to impact pup survival, as it can disrupt nursing and lead to energetic deficits in pre-weaned pups (NMFS, 2018).

  As detailed in Section 4.2.1, when undertaking nearshore and intertidal survey works or cable landfalls within or in the immediate vicinity of designated seal haul out and breeding sites SHEPD will apply mitigation measure M5 as described in Section 5.2.5. This, together with the adoption of best practice mitigation measures (as set out in Section 5), will minimise any potential impacts to seals, within the intertidal region. On the basis of this mitigation being applied, there will be no significant disturbance to seal species at their haul out sites.

- Otters – Otters are particularly sensitive to anthropogenic changes in their habitats, as their coastal habitat use is highly dependent on the inclusion of freshwater features (Roos *et al.*, 2015). A As such, the location of their holts (or dens) is restricted, and anthropogenic changes to their habitat may have severe repercussions, including localised extinctions. As detailed in Section 4, there is one cable corridor which has a landfall within or in the immediate vicinity of habitat designated for its importance to otters. As detailed in Section 5, SHEPD will implement pre-works otter surveys in these areas or provide an otter ecologist to advise survey personnel during shore based intertidal surveys of cable landfalls within or immediately adjacent to designated otter habitat. This will enable sensitive otter features to be identified and avoided, hence ensuring the proposed activities do not result in the destruction of, damage to, or obstruction of access to an otter holt, or other structure or place it uses for shelter or protection. Additionally, the temporary and short-term nature of any potential activities in the intertidal zone preclude significant impacts to the population from which any otters found within the project areas will belong. As such, impacts on otters are expected to be

extremely limited, will not impair an otter's ability to survive, breed or reproduce, or rear, or otherwise care for its young, and there will be no impact on the FCS of otters in the region.

Additional mitigation measures for avoiding potential impacts to otters during vessel based works, which will be implemented as a matter of best practice, are presented in Section 5. Considering the extremely limited nature of the potential effects on otters anticipated to result from the proposed survey activities, it is concluded that an EPS licence will not be required for otters.

3.5 Protected Species Conclusion

3.5.1 Impact to EPS

There will be no injurious impacts to cetaceans or otters as a result of Project activities and no requirement to apply for an EPS Licence in this respect, once proposed mitigation measures are applied (Section 5). However, there is potential for disturbance to cetaceans, and SHEPD will therefore apply for an EPS Licence with respect to disturbance to these species. However, this disturbance is expected to be limited to one or a few individuals of the local population and has been assessed to not result in any adverse impact to the FCS of any cetacean species.

It is recognised that the risk of disturbance to otters cannot be ruled out. However, the extremely limited nature of this effect will not constitute an offence under the Habitats Regulations, and hence an EPS licence for otters will not be required. The mitigations listed in Section 5 will further minimise any potential disturbance impacts to EPS.

3.5.2 Impact to Basking Sharks

The potential for impacts to basking sharks is considered very low and will be reduced through the implementation of mitigation measures (as outlined in Section 5.3). However, as disturbance to basking sharks remains a possibility, an application for a Basking Shark Licence under the Wildlife and Countryside Act 1981 (as amended) will be submitted.

3.5.3 Impact to Seabirds

Several seabird species have the potential to be disturbed by the physical presence of vessels during the geophysical survey activities and UAVs used in the intertidal and nearshore areas. However, given the temporary and relatively short-term nature of proposed activities, the potential impacts on protected seabirds will not result in killing of individuals or disturbance of eggs and nests, particularly with the implementation of the mitigation measures outlined in Section 5.5, and are therefore not considered to be significant with respect to the Wildlife and Countryside Act (as amended).

3.5.4 Impact to Seals

Project activities will not result in the capturing or killing of seals, and the protection provided to the two seal species present within the Outer Hebrides marine regions by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) will not be breached.

Furthermore, the short-term and localised nature of the proposed activities, that fact that the majority of activities will occur outside of important breeding and moulting areas, and that a number of mitigation measures will be adopted to further reduce any potential impacts to these species, all mean that harbour and grey seals associated

with protected haul out sites will not be significantly disturbed. As such the protected afforded to these species under the Protection of Seal (Designation of Haul-Out Sites) (Scotland) Act 2014 will not be breached.

3.5.5 Final Conclusion

Overall, the proposed geophysical survey operations constitute work of overriding public need while presenting a trivial and temporary disturbance to a few individual animals in a limited marine area, once the risk of injury has been mitigated.

4 PROTECTED SITES ASSESSMENT

4.1 Selection Criteria for Assessment of Protected Sites

Over and above potential impacts on protected species, the potential for the proposed cable surveys to impact protected sites (including designated seal haul-outs) needs to be considered. For each of the cable corridor the following criteria has been used to select those designated sites where potential impacts need to be assessed:

- SACs and NCMPAs (including proposed and candidate sites) with cetaceans as qualifying features within 50 km of the proposed geophysical surveys;
- SACs (including proposed and candidate sites) with harbour seal interests within 50 km of the proposed survey area and breeding grey seal within 20 km of the proposed survey area;
- Designated seal haul-outs or grey seal breeding sites that overlap with or located within 500 m of the proposed survey area;
- SACs and NCMPAs (including proposed and candidate sites) with otter interests that overlap with or located within 500 m of the proposed survey area;
- SPAs and NCMPAs (including proposed and candidate sites) with birds as qualifying features that overlap with or are located within 2 km of the proposed survey area; or
- SACs and NCMPAs (including proposed and candidate sites) with seabed / benthic / historic protected features that overlap with the proposed survey area.

The designated sites located in the vicinity of the cable routes which have the potential to be impacted by cable survey activities subject to the selection criteria above are outlined in Table 4-1 and shown in Figure 4-1.

For each designated site that has the potential to be impacted by the surveys, mitigation measures have been considered based upon site-specific protected features and these are also included within Table 4-1. Details of the mitigation measures are provided in Section 5.

It should be noted that some of the mitigation measures included in Section 5 may not be listed in Table 4-1 if they are not related to protecting designated features of identified sites. However, all mitigation measures in Section 5 will be applied to all activities, regardless of proximity to a protected site.

Table 4-1 Protected Sites in the Vicinity of the Proposed Cable Survey Corridors

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
Barra – Vatersay	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	5.8	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	1.4	M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	8	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	26.4	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver *Gavia stellate;* Black-throated diver *Gavia arctica;* Great Northern diver *Gavia immer;* Long-tailed duck *Clangula hyemalis;* Red-breasted merganser *Mergus serrato);* Slavonian grebe *Podiceps auratus;* Common eider *Somateria mollissima*	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
Benbecula – South Uist	Inner Bagh nam Faoileann & Loch Chill Eireabhaigh seal haul-out	The designated site is within 500 m of the cable corridor.	0.32	Harbour seal; Grey seal	Vessel presence, geophysical and video surveys, landfall topographic surveys	2.1	M1, M2, M3, M4, M6, M7	No
	Luib Bhan seal haul-out	The designated site is within 500 m of the cable corridor.	0	Harbour seal; Grey seal	Vessel presence, geophysical and video surveys, landfall topographic surveys		M1, M2, M3, M4, M6, M7	No
	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	9.1	Basking shark; Minke whale	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	31	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	40	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.6	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	Monach Islands SAC	The designated site is within 20 km of the cable corridor.	17.4	Grey seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	South Uist Machair and Lochs SPA	The designated site is within 2 km of the cable corridor.	1.8	Corncrake *Crex crex;* Little Tern *Sterna albifrons;* Dunlin *Calidris alpine schinzii;* Oyster catcher *Haematopus ostralegus;* Redshank *Tringa tetanus;* Ringed plover *Charadrius hiaticula;* Sanderling *Calidris alba*	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
Eriskay – Barra 2	Sea of the Hebrides MPA	The designated site is within 50 km of the cable corridor.	3	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	6.5	M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	0	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
		The designated site overlaps the cable corridor.	0	Reefs; Subtidal sandbanks	Geotechnical survey and benthic sampling'		N/A	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.3	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Eoligarry, Barra SPA	The designated site is within 2 km of the cable corridor	0	Corncrake	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	
Kisimul Castle	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	4.8	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	1.2	M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	5.9	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	24.5	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
Laxay – Kershader 2	North-east Lewis NCMPA	The designated site is within 50 km of the cable corridor.	7.6	Risso's dolphin	Vessel presence, geophysical and video surveys	1.4	M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.1	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Lewis Peatlands SPA	The designated site is within 2 km of the cable corridor	0.7	Black-throated diver, Dunlin, Golden eagle *Aquila chrysaetos*, Golden plover *Pluvialis apricaria*, Greenshank *Tringa nebularia*; Merlin *Falco columbarius*, Red-throated diver	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
North Uist – Benbecula	Flodda seal haul-out	The designated site is within 500 m of the cable corridor.	0	Harbour seal; Grey seal	Vessel presence, geophysical and video surveys, landfall topographic surveys	6.9	M1, M2, M3, M4, M6, M7	No
	Sea of the Hebrides MPA	The designated site is within 50 km of the cable corridor.	8.9	Basking shark; Minke whale	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	40.9	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	36.7	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.8	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Monach Islands SAC	The designated site is within 20 km of the cable corridor.	13.7	Grey seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	North Uist Machair and Islands SPA	The designated site is within 2 km of the cable corridor.	0.7	Corncrake; Dunlin; Oyster catcher; Redshank; Ringed plover; Greenland barnacle goose *Branta leucopsis*; Purple sandpiper *Calidris maritima*; Turnstone *Arenaria interpres*.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor	0.8	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
Claddach Centre	Sea of the Hebrides NCMPA	The designated site is within 20 km of the cable corridor.	8.3	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	1.1	M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	44	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	35.8	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.3	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Monach Islands SAC	The designated site is within 20 km of the cable corridor.	18.2	Grey seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
Claddach East	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	7.9	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	1.4	M1, M2, M3, M4, M6, M7, M8, M9	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	43.9	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	35.4	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	6.9	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Monach Islands SAC	The designated site is within 20 km of the cable corridor.	18.2	Grey seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
Claddach West	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	8.7	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	1.4	M1, M2, M3, M4, M6, M7, M8, M9	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	44	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	36.1	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	7.7	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Monach Islands SAC	The designated site is within 20 km of the cable corridor.	17.4	Grey seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
North Uist - Berneray	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	36.1	Harbour seal	Vessel presence, geophysical and video surveys	1.6	M1, M2, M3, M4, M6, M7	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	10.6	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16M12, M13, M14, M15	No
	North Uist Machair and Islands SPA	The designated site is within 2 km of the cable corridor.	0	Corncrake; Dunlin; Oyster catcher; Redshank; Ringed plover; Greenland barnacle goose; Purple sandpiper; Turnstone	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	12.8	Basking shark; Minke whale	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7, M8, M9	No
South Uist - Eriskay	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	0	Harbour seal	Vessel presence, geophysical and video surveys	2.8	M1, M2, M3, M4, M6, M7	No
		The designated site overlaps the cable corridor.	0	Reefs; Subtidal sandbanks	Benthic Sampling and Geotechnical surveys		N/A	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	6.8	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Kilpheder and Smerclate, South Uist SPA	The designated site is within 2 km of the cable corridor.	1.1	Corncrake	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	4.6	Basking shark; Minke whale	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7, M8, M9	No
South Uist - Barra	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	8.2	Basking shark; Minke whale	Vessel presence, geophysical and video surveys	5.2	M1, M2, M3, M4, M6, M7, M8, M9	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	8.9	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Sound of Barra SAC	The designated site is within 50 km of the cable corridor.	0	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
		The designated site overlaps the cable corridor.	0	Reefs; Subtidal sandbanks	Benthic Sampling and Geotechnical surveys		N/A	No
	Fiaray Seal Breeding Site	The designated site is within 500 m of the cable corridor.	0	Grey seal	Vessel presence, geophysical and video surveys, landfall topographic surveys		M1, M2, M3, M4, M6, M7	No
	Kilpheder and Smerclate, South Uist SPA	The designated site is within 2 km of the cable corridor.	0	Corncrake	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Eoligarry, Barra SPA	The designated site is within 2 km of the cable corridor.	0	Corncrake	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
North Uist - Harris	Sound of Harris Islands seal haul out site	The designated site is within 500 m of the cable corridor.	0	Harbour seal; Grey seal	Vessel presence, geophysical and video surveys, landfall topographic surveys	57.8	M1, M2, M3, M4, M6, M7	No

Cable corridor	Designated site potentially affected	Survey corridor overlaps with protected site or is within site selection criteria distance to protected site	Distance from nearest part of survey corridor to protected site (km)	Features of designated site (those marked *potentially most likely to be affected, PR=primary reason for selection)	Activity	Duration of survey activities – excluding standby allowance (days)	Proposed mitigation measures	Potential for likely significant effect
	Loch nam Madadh SAC	The designated site is within 500 m of the cable corridor.	0	Otter	Vessel presence, geophysical and video surveys, landfall topographic surveys		M10, M11, M12	No
		The designated site overlaps the cable corridor.	0	Lagoons; Intertidal mudflats and sandflats; Reefs; Shallow inlets and bays; Subtidal sandbanks	Benthic Sampling and Geotechnical surveys		N/A	No
	Inner Hebrides and the Minches SAC	The designated site is within 50 km of the cable corridor.	0	Harbour porpoise	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Ascrib, Isay and Dunvegan SAC	The designated site is within 50 km of the cable corridor.	18.6	Harbour seal	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	Sea of the Hebrides NCMPA	The designated site is within 50 km of the cable corridor.	0	Basking shark; Minke whale	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7, M8, M9	No
	North-east Lewis NCMPA	The designated site is within 50 km of the cable corridor.	42.4	Risso's dolphin	Vessel presence, geophysical and video surveys		M1, M2, M3, M4, M6, M7	No
	West Coast of the Outer Hebrides SPA	The designated site is within 2 km of the cable corridor.	0	Red-throated diver; Black-throated diver; Great Northern diver; Long-tailed duck; Red-breasted merganser; Slavonian grebe; Common eider.	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No
	Mointeach Scadabhaigh SPA	The designated site is within 2 km of the cable corridor.	0	Black-throated diver; Red-throated diver	Vessel presence, geophysical and video surveys		M13, M14, M15, M16	No

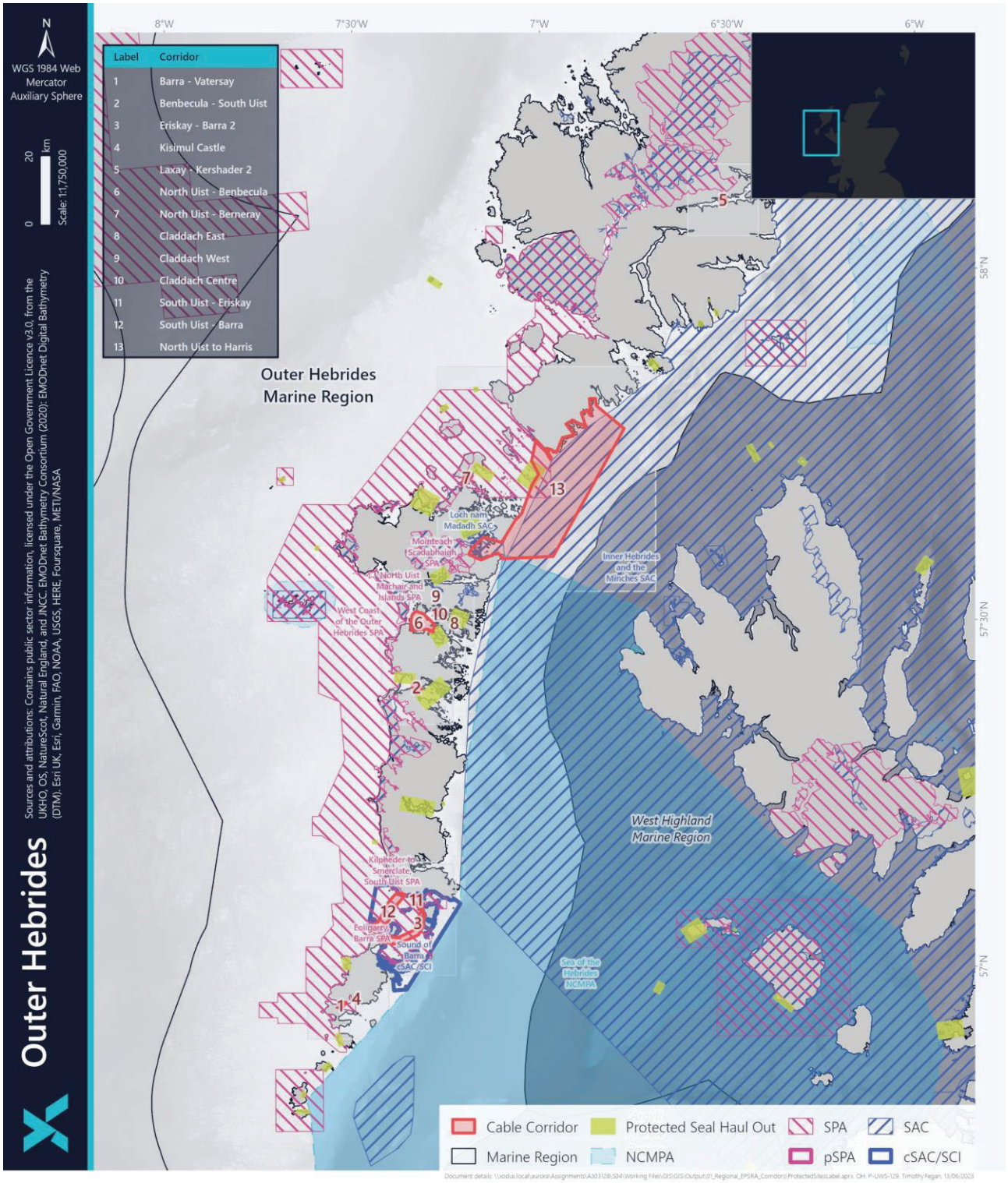


Figure 4-1 Outer Hebrides Protected Sites

4.2 Conclusion of Protected Site Assessment

A summary is presented in the following subsections of the potential impacts to designated sites which will be further reduced through the implementation of species-specific protection measures outlined in Section 5.

4.2.1 Potential Impact on SACs with Seals as a Feature and Seal Haul-Out Sites

There are three SACs with qualifying seal species in the vicinity of the proposed survey areas: Sound of Barra SAC and the Ascrib, Isay and Dunvegan SAC, which are designated for the conservation of harbour seals, and the Monach Islands SAC which is designated for the conservation of grey seals (JNCC, 2023a, b, c). The majority of the proposed cable survey corridors are located within 5 to 50 km of at least one of these sites (Table 4-1). There are three cable corridors which overlap with the Sound of Barra SAC, which is designated for harbour seal, these corridors are:

- Eriskay – Barra 2;
- South Uist – Eriskay; and
- South Uist – Barra.

Four of the cable corridors within the Outer Hebrides marine region overlap a designated seal haul-out or breeding site, one cable corridor does not overlap a seal haul out, however, is within 500 m, these are:

- Benbecula – South Uist overlaps the Luib Bhan seal haul out site and is within 500m of the Inner Bagh nam Faoileann & Loch Chill Eireabhaigh seal haul out site;
- North Uist – Benbecula overlaps the Flodda seal haul-out site;
- South Uist – Barra overlaps with the Fiaray seal breeding site; and
- North Uist to Harris overlaps with the Sound of Harris Islands seal haul out site.

Harbour seals and grey seals are most sensitive to impacts during the pupping and moulting season. The pupping season for grey seals in the Outer Hebrides is generally mid-September through to mid-November, and moulting occurs thereafter during December and January (SCOS, 2018). For harbour seals the pupping season is mid-June to July, followed by moulting in August (SCOS, 2018). The proposed survey activities, which include geophysical and bathymetric surveys and calibration tests which will be carried out between 1st October 2023 and 30th September 2028, have the potential to coincide with these sensitive periods for harbour and grey seals.

Due to the short duration of proposed survey activities close to or within designated seal sites, it is considered that offshore vessel presence and survey operations will have no likely significant effect or adverse impacts on either seal species at sea or onshore. Therefore, no likely significant effects on seal SACs are identified in this regard.

However, as detailed above, seals are more susceptible to disturbance while ashore, particularly during the breeding and moult periods. The presence of vessels very close to shore, or as a result of shore-based survey works in the intertidal region, has the potential to result in seals flushing (rapidly returning to sea) if such activities are conducted too close to a haul-out or breeding site. During the breeding season, this has the potential to result in pup abandonment or crushing by adults. If disturbance at a haul-out or breeding site occurs during the moult, seals returning to the seal will be subjected to thermoregulatory stress as their fur is not in a suitable condition. As a result it is recognised that disturbance at a seal haul-out or breeding sites by nearshore or intertidal works may result in a

reduction of fitness of seal species at an individual or population level, particularly if the disturbance occurs regularly or is repeated over multiple seasons.

Therefore, where cable corridor landfalls are located within or adjacent to a designated seal haul-out, breeding site, or SAC designated for seals, SHEPD will apply mitigation measure M5 as described in Section 5.2.5.. This will reduce the risk of the proposed survey works resulting in disturbance and flushing of seals during their most sensitive periods, thus ensuring that the proposed cable surveys do not adversely impact the conservation objectives of the SACs or result in an offence under Section 117 of the Marine (Scotland) Act 2010.

The measures detailed in Section 5, together with a number of best practice mitigation measures that will be followed will further reduce any potential impacts to seal species.

4.2.2 Potential Impact on SACs and MPAs with Highly Mobile Megafauna (i.e., Cetaceans and Basking shark) as a Feature

All the Outer Hebrides marine region cable survey corridors are located within 50 km of the Inner Hebrides and the Minches SAC, which is designated for the conservation of harbour porpoise (JNCC, 2023d). This includes the North Uist to Harris cable corridor which is the only cable corridor to directly overlap with the site.

In addition, all of the cable corridors, with the exception of the Laxay – Kershader 2 cable corridor, are located within 50 km for the Sea of Hebrides NCMPA (SNH, 2019a), a site designated for the conservation of basking sharks and minke whale. This includes the North Uist to Harris cable corridor which is the only cable corridor to directly overlap with the site.

The North-East Lewis NCMPA, designated for the conservation of Risso's dolphin is also within 50 km of the Laxay – Kershader 2 and North Uist to Harris cable corridors (SNH, 2019c), although there is no direct overlap with these sites.

As outlined in Section 3.5.5, there will be no injurious impacts to cetacean species as a result of the survey activities, and the potential impacts to basking sharks is considered to be very low. Although the Outer Hebrides Marine Region cable survey corridors are within 50 km of, and in certain instances directly overlap with the identified SACs and NCMPAs designated for highly mobile megafauna species, due to the localised and relatively short term and temporary nature of the proposed works, as well at the incorporation of mitigation measures (as outlined in Section 5), no adverse impacts to the conservation status of these designated sites are expected.

A full assessment of the potential impacts of survey activities on cetaceans and basking sharks is provided in Section 3.

4.2.3 Potential Impact on SACs with Otters as a Feature

The North Uist to Harris cable corridor overlaps with the Loch nam Madadh SAC, which is designated for otters (JNCC, 2023e). No other cable corridors overlap or are within 500 m of a SAC which are designated for otter.

Otters may be disturbed by the presence of vessels but are not as sensitive to sound as cetaceans for example. Due to the short period of time in the nearshore area adjacent to landfalls, compared to the overall survey period, disturbance will be temporary; therefore, no adverse impacts to otters are expected as a result of the vessel-based operations. Furthermore, as detailed in Section 5, the proposed mitigation measures will ensure that the shore based intertidal survey works will not result in the disturbance of or damage to otter holts or other sensitive otter features. As a result, no adverse significant effects are expected on the integrity of the SACs designated for otters that are located within proximity to the cable survey corridors.

4.2.4 Potential Impact on SACs and NCMPAs with Benthic Features

There are three cable corridors that directly overlap with the Sound of Barra SAC, a site which is designated for the conservation of reefs and subtidal sandbanks (JNCC, 2019a). The overlapping cable corridors are: Eriskay – Barra 2, South Uist – Eriskay and South Uist – Barra. Additionally, the North Uist to Harris cable corridor overlaps the Loch nam Madadh SAC which is designated for lagoons; intertidal mudflats and sandflats; reefs; shallow inlets and bays and subtidal sandbanks (JNCC, 2023e).

The project activities that have the potential to interact with the seabed, and benthic features include benthic sediment sampling and vibrocoring (with PCPT). Given the relatively small volume of sediment which will be extracted during the sampling activity, and the video inspection preceding sediment sampling, any impacts on sensitive habitats will be avoided. Moreover, only a relatively small area will be impacted during benthic grab sampling, vibrocoring and PCPT activities. Consequently, the proposed survey activities are not likely to have a significant effect on the conservation objectives of either of these designated sites.

4.2.5 Potential Impact on SPAs

West Coast of the Outer Hebrides SPA

The West Coast of the Outer Hebrides Special Protection Area (SPA) covers the south-west coast of the Outer Hebrides form the northwest coast of Harris, along the west coasts of North Uist to the south of Barra (SNH, 2019b). This area consists of sandy shores and sheltered bays and inlets ideal for birds to moult, rest and feed. The sea depths are shallow in this region and the seabed consists of mixed sediment, including shell-sand and gravel. This site also supports on of the largest unchanged kelp forests in Scotland, which sustain a wide diversity of plants and animals, such as fish and invertebrates. As a result this SPA has a diverse and rich marine life which forms a high-quality feeding habitat for diving birds (SNH, 2019b).

The West Coast of the Outer Hebrides SPA qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: great northern diver, black-throated diver and Slavonian grebe. The site also qualifies under Article 4.1 by regularly supporting a population of European importance of the Annex 1 species red-throated diver during the breeding season. The site further qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species: common eider, long-tailed duck and red-breasted merganser (NatureScot, 2023b).

Seven of the cable corridors directly overlap with this SPA, these include: Barra – Vatersay, Eriskay – Barra, Kisimul Castle, North Uist – Berneray, South Uist – Eriskay, South Uist – Barra and North Uist to Harris. Additionally, the North Uist – Benbecula cable corridor is located within 1 km of the SPA. For these cable corridors, the proposed survey activities could comprise geophysical, geotechnical and video surveys e.g. using UAVs, as well as the testing and calibration of survey equipment. Survey activities within these cable corridors (excluding standby allowances) is anticipated to take a maximum of 25 days, attributed to the largest cable corridor; North Uist to Harris. The other smaller cable corridors will take a maximum of 7 days (excluding standby allowances). Nonetheless, the activities near landfall where these birds may be located will be significantly shorter in duration.

Although the proposed survey activities have the potential to result in disturbance to the foraging activities of seabirds, the possibility of collisions will be minimised by the slow movement of vessels and precaution whilst utilising UAVs. Moreover, the temporary and localised nature of the works proposed, the fact that additional vessel will not constitute a substantive change in baseline conditions, and the adoption of mitigation measures (as outlined in Section 5), mean that any potential disturbance to these bird species will be limited. Therefore, no significant effects

on these bird species at either an individual of local population level are likely, and hence no adverse impact will result on the conservation objectives of the West Coast of the Outer Hebrides SPA.

South Uist Machair and Lochs SPA

The South Uist Machair and Lochs SPA is a complex site along the west coast of South Uist. The site is composed of acidic moorland calcareous coastal plain, the transition from freshwater to saltwater habitats and wet and dry machair with eutrophic machair lochs. South Uist Machair and Lochs SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species: corncrake, little tern and dunlin. The SPA further qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species: ringed plover, redshank, oyster catcher and sanderling (NatureScot, 2023c).

The Benbecula – South Uist cable corridor is located within 2 km of the South Uist Machair and Lochs SPA, however, does not directly overlap the site. The surveys within this cable corridor could include geophysical, geotechnical and video surveys (including UAV), as well as the testing and calibration of survey equipment. The proposed survey activities within this cable corridor will take a maximum of 2 days (excluding standby allowances).

Given that there is no direct overlap with the SPA, no significant effects are anticipated on the coastal bird species for which the site is designated, or the habitats upon which these species depend. The adoption of mitigation measures (as outlined in Section 5) and the temporary and localised nature of the survey works proposed, will also minimise any potential impacts to the qualifying species or features of this SPA, and as a result no adverse impact is anticipated on the conservation station of the South Uist Machair and Lochs SPA.

North Uist Machair and Lochs SPA

The North Uist Machair and Lochs SPA is located along the northwestern coasts of North Uist. This site is characterised by a range of coastal and freshwater habitats including saltmarshes, acid grassland, eutrophic machair locks, wet machair and rocky shores. The North Uist Machair and Islands SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species: corncrake, Greenland barnacle goose and dunlin. The SPA further qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species: ringed plover, turnstone, purple sandpiper, redshank and oyster catcher (NatureScot, 2023d).

The North Uist Machair and Lochs SPA directly overlaps with the North Uist – Bernersay cable corridor, and the North Uist – Benbecula cable corridor is less than 1 km away from the SPA. For these cable corridors, the proposed survey activities are anticipated to take a maximum of 7 days (excluding standby allowances). Nonetheless, the activities near landfall where these birds may be located will be significantly shorter in duration.

The qualifying features of this site do not forage at sea and are only likely to be present close to the coast. Although there is a direct overlap between this SPA and the North Uist – Bernersay cable corridor, the short duration and limited spatial extent of proposed survey works in the nearshore environment means that any significant effects to qualifying bird species, or the habitats upon which they depend are not anticipated. The mitigation measures outlined in Section 5 will also minimise any potential disturbance to the qualifying features of the SPA. Therefore, no significant effects on these bird species at either an individual or local population level are expected, and therefore no adverse impact will result on the conservation objectives of the North Uist Machair and Lochs SPA.

Mointeach Scadabhaigh SPA

The Mointeach Scadabhaigh SPA is a terrestrial SPA which is located in North Uist. The SPA is a large area of peatland, lochans and lochs centred on Loch Scadabhaigh, the largest freshwater body in North Uist. Both Loch Scadabhaigh

and the neighbouring Loch nan Eun have intricate shorelines and many islands. The boundaries of the SPA span to the coast of North Uist (NatureScot, 2023e).

Mointeach Scadabhaigh SPA qualifies under Article 4.1 of the Birds Directive by regularly supporting nationally important breeding populations of red-throated diver and black-throated diver. This red-throated diver population is one of the largest and highest density breeding populations in the UK.

The North Uist to Harris survey cable corridor overlaps this SPA at the landfall. Although, both red throated diver and black throated diver are predominantly terrestrial birds, they will often forage around the coastal seas during the winter months. The North Uist to Harris survey is likely to take a maximum of 25 days (excluding standby allowances) due to the length of the cable corridor. Nonetheless, the activities near landfall where these birds may be located will be significantly shorter in duration. As such, any disturbance impacts from the vessel and UAV surveys will be temporary. In addition, mitigations including best practice in relation to breeding birds and mitigations with regards to light pollution will be adhered to when working within the SPA area (as discussed in Section 5.5). Therefore, there is expected to be no adverse impact on the conservation status of the Mointeach Scadabhaigh SPA.

Lewis Peatlands SPA

The Lewis Peatlands SPA is a terrestrial SPA located on the island of Lewis, the northernmost of the main islands of the Outer Hebrides off the north-west coast of Scotland. The site comprises an extensive area of deep blanket bog, interspersed with bog pool complexes and freshwater lochs. Lewis Peatlands SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species red-throated diver, black-throated diver, golden eagle, merlin, golden plover and dunlin. Lewis Peatlands SPA further qualifies under Article 4.2, by regularly supporting a population of the migratory species: greenshank (NatureScot, 2023f).

The Laxay – Kershader 2 cable corridor does not directly overlap this SPA but is located within 1 km of the SPA. The survey activities associated with this cable corridor are anticipated to take a maximum of 1.4 days (excluding standby allowances).

The features of this SPA are all terrestrial but may be present close to the coast. Although the Laxay – Kershader 2 cable corridor is within proximity to this SPA, the short duration and limited spatial extent of proposed survey works in the nearshore environment means that any significant effects to qualifying bird species, or the habitats upon which they depend are not anticipated. The mitigation measures outlined in Section 5 will also minimise any potential disturbance to the qualifying features of the SPA. Therefore, no significant effects on these bird species at either an individual or local population level are expected, and therefore no adverse impact will result on the conservation objectives of the Lewis Peatlands SPA.

Eoligarry, Barra SPA and Kilpheder to Smerclate, South Uist SPA

The Eoligarry, Barra SPA lies at the northern tip of the island of Barra, and comprises sand dunes, cultivated machair and croft land with small areas of wetland and rough pasture. The Kilpheder to Smerclate, South Uist SPA is located in the south-west of the island of South Uist. The Smerclate section comprises cultivated machair and croft land, a small loch and areas of marsh. The Kilpheder section extends southwards to Garrynamonie and encompasses cultivated machair, wet machair, large marsh areas with reedbeds and iris beds, and several small lochs. Both sites qualify for SPA classification under Article 4.1 of the Birds Directive by regularly supporting a nationally important breeding population of the Annex 1 species, corncrake (NatureScot, 2023g; 2023h).

Two cable corridors overlap the Eoligarry, Barra SPA at the landfall, these are the South Uist – Barra and Eriskay – Barra 2. These two cable corridors are also within proximity to the Kilpheder to Smerclate, South Uist, with the South

Uist – Barra cable corridor overlapping the SPA at the landfall and the South Uist – Eriskay cable corridor within 2 km of the SPA. These surveys will take a maximum of 6.5 days (excluding standby allowances). Nonetheless, the activities near landfall where these birds may be located will be significantly shorter in duration.

As corncrakes are terrestrial animals, they are very unlikely to be impacted by the geophysical and UAV surveys activities. The temporary and localised nature of the geophysical and UAV surveys are unlikely to significant effect on populations of corncrake. In addition, mitigations including best practice in relation to breeding birds and mitigations with regards to light pollution will be adhered to when working within the SPA area (as discussed in Section 5.5). Therefore, no adverse impact is expected on the conservation status of the Eoligarry, Barra SPA or the Kilpheder to Smerclate, South Uist SPA.

4.2.6 Conclusion

The cable route surveys proposed for the 16 cables present within the 13 Outer Hebrides Marine Region cable corridors will take approximately 173 days in total which includes 116 days of standby allowances. It is unlikely that cable routes within the same region will require geophysical surveys to occur concurrently, although more than one survey vessel may be present on any one route at the same time.

No adverse impacts on the populations of cetaceans and basking sharks associated with designated sites are anticipated as a result of survey equipment calibration testing and geophysical survey work, and the explanation for this conclusion is provided in Section 3.

The proposed survey works for the Outer Hebrides marine region will occur sometime between 1st October 2023 and 30th Sepetmber 2028. As such the proposed activities have the potential to coincide with the breeding and moulting seasons of harbour seal, grey seal and numerous seabird species (both breeding and migratory). However, given the relatively short-term nature of proposed survey works across the majority of the cable corridors within the region, as well as the transient nature of survey activities, it is considered unlikely that the proposed works will significantly impact upon breeding bird and seal species. No adverse impacts are anticipated on the conservation status of qualifying species, and hence the conservation objectives of designated sites will not be adversely affected.

Due to the temporary and localise nature of proposed activities within the overall survey window and the mitigation measures that will be adopted as part of the cable corridor surveys (as outlined in Section 5), no significant impacts or in-combination impacts (see section 4.3 below) are anticipated to the conservation objectives of any protected site considered.

Overall, the monitoring of submarine power cables constitutes work of an overriding public need whilst presenting a trivial and temporary disturbance in a limited area.

4.3 In-Combination Effects

Several other concurrent, preceding or subsequent activities are taking place within the Outer Hebrides Marine Region which could have an accumulative risk of disturbance to EPS.

These activities, identified via the Marine Scotland EPS Licence register (https://marine.gov.scot/mslot-document-categories/eps-licence) are provided below in Table 4-2.

Table 4-2 List of licensed activities within the Outer Hebrides region which could impact on EPS in combination with the SHEPD Outer Hebrides cable corridor surveys

EPS Licence Number or Reference	Project Name (Licence to Injure/ Disturb)	Period Licence Valid From/To	Number of EPS Predicted to be Injured (PTS/TTS)	Number of EPS Predicted to be Disturbed
00009982	Profiling Survey- Loch Carnan, South Uist *(Disturb)*	10/01/2023 – 31/12/2023	N/A	Harbour porpoise: 1.25 individuals / 0.02 % of population
				Minke whale: 0.06 individuals/ 0.02 % of the population
				Common dolphin: 0.05 individuals/ 0.02% of the population
00009686	Deep Water Port, Glumaig Bay, Stornoway *(Disturb)*	20/10/2022 – 30/06/2025	Unknown: The development poses no risk of causing disturbance or injurious effects at a level which could impact upon an individual's ability to survive, breed, reproduce or raise young long-term with the implementation of mitigation. Marine mammals may experience some disturbance due to the location of the works. This, however, will be limited in extent and short-term in duration.	

SHEPD have considered this list of projects with regard to the relevant MUs for each EPS species (see Table 3-2). Each of these activities is licensed for a limited time period, and the duration of most activities within that time period is typically shorter. In addition to the short duration of each of these activities, the predicted levels of disturbance associated with each activity is very small (where this information is available on the MS EPS Licence portal).

Cumulative/in-combination impacts have the potential to reach levels that could impact negatively on cetacean species, with consequences for maintaining those species at FCS. The conservation status is considered 'favourable' when:

- population dynamics data on the species concerned indicates that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Based on available data, it is considered that the population of each cetacean MU is being maintained on a long-term basis as a viable component of its natural habitat (Hammond et al, 2021; IAMMWG, 2022). No activities within the in-combination list (i.e. activities with EPS licences) are predicted to have the potential to reduce the natural range of the species for the foreseeable future. Each relevant cetacean MU comprises sufficiently large area of habitat for populations to be maintained at FCS on a long-term basis.

SHEPD have considered the information included in this EPS Risk Assessment in relation to the SHEPD Outer Hebrides Marine Region cable corridor surveys, in combination with information available on other activities capable of impacting on EPS, together with the latest information on cetacean MUs (IAMMWG, 2022). SHEPD conclude that there is no cumulative or in-combination risk to the MU populations of harbour porpoise, minke whale, bottlenose dolphin, common dolphin, white beaked dolphin and Risso's Dolphin.

5 SPECIES PROTECTION MEASURES

5.1 Overview

This section summarises the proposed mitigation measures to be implemented for avoiding and reducing potential impacts on species that may be present in the vicinity of the cable inspections and any required survey works. The M1 to M11 mitigations detailed below for marine mammals, basking sharks and otter are applicable only for use of SBP.

Although species and task specific mitigation is provided below, the following measures will be implemented during all proposed survey works:

- All vessels will adhere to the provisions of the Scottish Marine Wildlife Watching Code (SNH, 2017), and the Basking Shark Code of Conduct (SMWWC, 2023); and
- Survey personnel will be made aware of all protected species within the marine environment, and their responsibility to implement the mitigation in this document.

5.2 Marine Mammals

The Marine Mammal Protection Plan (MMPP) is implemented through the adherence to the mitigations set out below. Compliance with these mitigations will reduce risk of injury and disturbance to marine mammals resulting from SBP survey operations, these mitigations are aligned with the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017). It is noted that most SBP are not capable of performing a soft-start, and hence this procedure is not included. The key components of the MMPP for SBP include:

- Deployment of a MMO to monitor for the presence of cetaceans and seals within the mitigation zone (see below), prior to the commencement of SBP operations;
- For SBP operations during hours of darkness and/or in periods of poor visibility and/or during periods when the sea state is greater than Beaufort 3, deployment of Passive Acoustic Monitoring (PAM) system to detect for the presence of vocalising cetaceans that cannot be observed by the MMO;
- 500 m mitigation zone for cetaceans;
- 500 m mitigation zone for seals, reducing to 100 m in the event of a need to avoid critical delay to the project; and
- Reporting procedure.

5.2.1 M1 – Marine Mammal Monitoring

There will be MMO coverage for the duration of SBP activities, with adequately trained and experienced MMO(s) working standard 12-hour shifts. They will have experience of working at sea and will have successfully deployed and used PAM equipment previously. They will be equipped with binoculars offering at least 8x magnification. The MMO will be located at a high point on the vessel which provides good all-round visibility.

5.2.2 M2 – Marine Mammal Observer (MMO)

During daylight hours the MMO(s) will undertake visual observations to monitor for the presence of cetaceans, seals and basking sharks before the SBP is activated and will advise of the need for delays in the commencement of operations should any marine mammals be detected within the 500 m mitigation zone. The 500 m mitigation zone will be for seals and basking sharks, except in the need to avoid critical delay to the Project in which case the mitigation sone for both species' groups will be reduced to 100 m. The criteria as to what constitutes a critical delay leading to this reduction in mitigation zone will be assessed on a case-by-case basis in consultation with MS-LOT.

5.2.3 M3 – Passive Acoustic Monitoring (PAM)

When visibility is poor (i.e. due to fog or during hours of darkness) and/or during periods when the sea state is greater than Beaufort 3, the PAM system will be operated by a single MMO/PAM operator. The PAM system will comprise of at least three hydrophone elements, allowing for directional localisation of detections, together with software allowing real time detection of marine mammal vocalisations (e.g., PAMGuard or equivalent).

5.2.4 M4 – Pre-Start Search

Visual (MMO) (and acoustic (PAM) monitoring if required) will be conducted for a pre-start search of 30 minutes (i.e., prior to the commencement of SBP operations). This will involve a visual (during daylight hours) or PAM watch (during poor visibility or at night) to determine if any cetaceans, seals or basking sharks are within the 500 m buffer of survey activities (or within 100 m in the event of critical delay (are described in mitigation measure M2)). It is recognised that PAM cannot detect seals or basking Shark. During poor visibility or during hours of darkness, PAM alone will be the sole means of pre-start monitoring.

5.2.5 M5 – Designated Seal Haul-Outs

During hours of darkness and in poor visibility when the MMO cannot monitor for the visibility of seals and otters, the equipment must not be deployed or started within 100 m of any SAC designated for the conservation of seals or a designated seal-haul out site. The SBP must be started outwith this distance, and the vessel the moved in to position once the SBP is sounding.

Where cable landfalls are located in or within 500 m of a designated seal haul-out, breeding site, or SAC designated for seals; SHEPD will ensure that, unless required for emergency works relating a cable fault, shore-based intertidal survey works, and nearshore vessel-based surveys within 200 m of land are scheduled to take place out-with the breeding or moulting seasons for the relevant seal species. Specifically, the periods that will be avoided are:

- Grey seal sites:
    - 15th September – 15th November (inclusive) for the breeding season; and
    - 1st December – 31st January (inclusive) for the moult.
- Harbour seal sites:
    - 15th June – 31st August (inclusive) for the breeding season and moult.

If the MMO confirms that no seals are hauled out onshore inside a designated haul out, breeding site or SAC such that they would be within 200 m of the vessel; personnel onshore or other operations; the above seasonal restrictions shall not apply to intertidal and nearshore survey operations, and the surveys will be permitted to continue.

5.2.6 M6 – Cetacean, Seal and Basking Shark Mitigation Zone

The mitigation zone is defined as the area within 500 m of SBP operating; noting that if the SBP is deployed on a ROV/ROTV, this will be the centre of the mitigation zone, and not the vessel. Should any cetaceans, seals or basking sharks be detected within the mitigation zone prior to the commencement of SBP operations (or after breaks in SBP survey activities of more than 10 minutes), operations will be delayed until their passage, or the transit of the vessel, resulting in the cetaceans, seals or basking sharks being outwith the mitigation zone. In all three cases, there will be a 20-minute delay from the time of the last sighting within the mitigation zone the commencement/recommencement of SBP operations.

As outlined in mitigation measure M2, the mitigation zone for seals and basking sharks may be reduced from 500 m to 100 m in the event of a need to avoid critical delay to the project, subject to agreement with MS-LOT.

5.2.7 M7 – Reporting

All recording of cetaceans, seals and basking sharks will be made using JNCC Standard Forms. At the end of the operations, a monitoring report detailing the cetaceans recorded, methods used to detect them, and details of any problems encountered will be submitted to Marine Scotland and NatureScot. The report will also include feedback on how successful the mitigation measures were. This requirement will be communicated to the MMOs at project start up meetings and at crew change.

5.3 Basking Shark

The following mitigation measures will be implemented during SBP operations in order to reduce disturbance to basking sharks:

5.3.1 M8 – Basking Shark Monitoring

There will be MMO coverage for the duration of the marine activities, with adequately trained and experienced MMO(s) working standard 12 hour shifts. The MMO will also monitor for the presence of basking shark following the mitigation measures described above for Marine Mammal Monitoring (see 5.2.1). Should any basking sharks be detected within 500 m of the vessel prior to the commencement of SBP surveys (or after breaks in geophysical survey activity of more than 10 minutes), operations will be delayed until their passage, or the transit of the vessel, results in the animals being out-with the mitigation zone. In all cases, there will be a 20 minute delay from the time of the last sighting within the mitigation zone to the commencement/ recommencement of the operations.

5.3.2 M9 – Basking Shark Mitigation Zone

During survey works, the MMO will monitor for the presence of basking sharks, in addition to marine mammals and otters, and will delay the start time of survey works if any are seen within 500 m of the survey vessel. The mitigation zone for basking sharks may be reduced from 500 m to 100 m in the event of a need to avoid critical delay to the project subject to agreement with MS-LOT.

5.4 Otters

The following mitigation measure will be implemented in order to reduce disturbance to otters:

5.4.1 M10 – Otter Monitoring

There will be MMO coverage for the duration of the SBP survey operations, with adequately trained and experienced MMO(s) working standard 12-hour shifts. The MMO will also monitor for the presence of otters (as outlines in Section 5.2.1 Mitigation Measure M1).

5.4.2 M11 – Otter Mitigation Zone

When working within 500 m of any SAC designated for otters, the MMO monitors for the presence of otters in the water in addition to marine mammals and basking sharks and delays the start of the survey if any are seen within 200 m of the survey vessel. If working during the hours of darkness or in poor visibility when the MMO is not able to monitor otters, the SBP will not be started within 200 m of a SAC designated for otters. Instead the SBP will be started outwith this distance, and the vessel then moved into position once the SBP is sounding.

5.4.3 M12 – Otter Mitigation for Shore Based Survey Operations

For shore based intertidal surveys of cable landfall sites where the survey corridor is located inside or within 500 m of an SAC designated for the conservation of otters, either of the following measures shall be adopted:

- Otter surveys will be conducted by an appropriately qualified ecologist prior to the commencement of any cable survey operations, and will include the cable landfall survey area and a 200 m mitigation zone; and
- An appropriately qualified ecologist will be appointed to work with the survey personnel and ensure sensitive otter sites are not disturbed.

The pre-works otter survey or ecologist working with the cable survey personnel will ensure the following:

- Any otter holts, layups and couches will be identified and avoided by a 40 m buffer during shore based cable landfall survey operations.

5.5 Seabirds

The following mitigation measures will be implemented in order to reduce disturbance to seabirds:

5.5.1 M13 – Rafting Seabirds

The survey vessels will be moving at a speed of 4-8 knots during survey operations, to allow any rafting seabirds time to disperse before the vessel arrives. When not on survey effort, vessels will avoid bird rafts where operationally possible, and it is safe to do so.

5.5.2 M14 – Wintering Birds

When within a SPA which has been designated for wintering birds that may roost or feed in close proximity to the cable survey corridor or the landfall, further consultation will be undertaken with NatureScot on the requirement for any seasonal restriction to be implemented for cable inspections or survey activities, including UAVs operated from land, in order to avoid disturbance to qualifying species during the most sensitive time of the year.

5.5.3 M15 – Breeding Birds

When within a SPA which has been designated for breeding birds that may nest or feed in close proximity to the cable survey corridor or the landfall, further consultation will be undertaken with NatureScot on the requirement for any seasonal restriction to be implemented for equipment calibration and testing, as well as geophysical survey activities, including UAVs operated from land, in order to avoid disturbance to qualifying species during the most sensitive time of the year.

5.5.4 M16 – Light Disturbance

When within an SPA and where there is the potential for 24-hour working, the following measure will be implemented to minimise the potential impacts to birds:

- Lighting on-board the cable survey vessel(s) will be kept to the minimum level required to ensure safe operations;
- Lights will be directed or shielded to prevent upward illumination and minimise disturbance; and
- Blackout blinds and/or curtains will be used where possible when working within marine SPAs.

6 CONCLUSION

This risk assessment has assessed the risks posed by the geophysical survey (including equipment calibration) activities associated with the cable routes within the Outer Hebrides marine region to EPS and protected sites. This have included assessing the risk caused by noise emitted from the vessel(s) and the geophysical survey works, collision impact and disturbance to the following protected species and sites:

- Cetaceans;
- Seals;
- Otters;
- Basking sharks;
- Birds;
- SACs;
- NCMPAs; and
- SPAs

The duration of the survey activities for all 16 cable routes within the Outer Hebrides Marine Region are expected to take approximately 173 days in total which includes 116 days for standby allowances.

The Outer Hebrides cable survey corridors are all located within 50 km of the Inner Hebrides and the Minches SAC. Additionally, all cable corridors with the exception of the Laxay – Kershader 2 cable corridor are located within 50 km of the Sea of Hebrides NCMPA. Two cable survey corridors are also located within 50 km of the North-east Lewis NCMPA. All three sites are designated for the conservation of cetaceans. However, due to the localised and temporary nature of proposed geophysical surveys, in combination with the proposed mitigation measures, no adverse impacts through injury to cetaceans are anticipated. The use of geophysical survey equipment has the potential to result in disturbance to cetaceans in the vicinity and as such, an application for an EPS Licence will be submitted.

The Sea of Hebrides NCMPA is also designated for the conservation of basking sharks. However, the assessment found that proposed survey works of cable corridors have a very low potential to result in adverse impacts on this species, due to the localised and temporary nature of survey operations. Impacts have been further reduced through the implementation of mitigation measures. However, disturbance to basking sharks remains a possibility, and as such, an application for a Basking Shark Licence will be submitted.

The majority of cable corridors within the Outer Hebrides Marine Region are located within 50 km of the Sound of Barra SAC, Ascrib, Isay and Dunvegan SAC and the Monach Islands SAC, designated for the conservation of harbour and grey seals. There is a high density of harbour and grey seals throughout most of the proposed survey areas, and several cable corridors are either within or in close proximity to a designated seal haul-out or breeding sites. Due to the localised nature of each individual cable route survey activity, long-term impacts to harbour and grey seal populations will not be significant. A number of mitigation measure will also be implemented to further reduce any potential impacts on seals resulting from proposed survey activities.

The survey corridor will directly interact with the Sound of Barra SAC and the Loch nam Madadh SAC, which are both partially designated for the conservation of benthic features. A relatively small number of benthic samples will be extracted during survey activities, of less than 1 m^3 and no impacts to this site are anticipated. Nevertheless, any benthic sampling activities will be subject to a future Marine Licence Exemption application.

The survey activities have the potential to result in disturbance to otters, and one of the cable corridors (North Uist to Harris) overlaps the Loch nam Madadh SAC for which otter are a qualifying feature. Due to the short duration of activities in the nearshore area adjacent to landfalls compared with the overall survey period proposed for the cable corridors, disturbance will be temporary and localised; therefore, no adverse impacts to otters are anticipated. The proposed mitigation measures will ensure that disturbance to otters resulting from survey works is further reduced, therefore an otter EPS Licences will not be required.

Breeding and moulting seabird species may be impacted by the physical presence of vessels within the survey corridors or through UAV utilisation in the intertidal and nearshore areas, however, given the temporary and transient nature of the proposed activities the potential impacts on seabirds are not considered to be significant. The survey corridors are within the vicinity of seven SPAs; the West Coast of the Outer Hebrides SPA, South Uist Machair and Lochs SPA, North Uist Machair and Lochs SPA, Mointeach Scadabhaigh SPA, Lewis Peatlands SPA, Eoligarry, Barra SPA and Kilpheder to Smerclate, South Uist SPA. Due to the temporary and localised nature of the surveys, particularly with regard to works in proximity to the landfall areas, and therefore these sites, no significant or adverse impact is anticipated on any of the sites. Further to this, a number of mitigation strategies will also be followed to further reduce any potential impact on birds.

Overall, the proposed survey operations constitute work of an overriding public need while presenting a trivial and temporary disturbance in a limited area.

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APPENDIX A TABLE OF CABLE CORRIDOR COORDINATES

For the avoidance of doubt, the landward boundaries of the cable corridor co-ordinates covered by this EPS Risk Assessment shall be MHWS. The landfall boundaries defined by the coordinates within this document should be considered approximations, due to the requirement to limit the number of vertices.

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
Barra - Vatersay	-7.524251544	56.93998497	7° 31' 27.305" W	56° 56' 23.945" N	7° 31.455093' W	56° 56.399098' N
	-7.530131767	56.93882677	7° 31' 48.474" W	56° 56' 19.776" N	7° 31.807906' W	56° 56.329606' N
	-7.535673008	56.93991495	7° 32' 8.422" W	56° 56' 23.693" N	7° 32.14038' W	56° 56.394897' N
	-7.530039853	56.94229744	7° 31' 48.143" W	56° 56' 32.270" N	7° 31.802391' W	56° 56.537846' N
	-7.533212489	56.94556854	7° 31' 59.564" W	56° 56' 44.046" N	7° 31.992749' W	56° 56.734112' N
	-7.531272757	56.94739003	7° 31' 52.581" W	56° 56' 50.604" N	7° 31.876365' W	56° 56.843402' N
	-7.527021967	56.94710164	7° 31' 37.279" W	56° 56' 49.565" N	7° 31.621318' W	56° 56.826098' N
	-7.52166857	56.94826488	7° 31' 18.006" W	56° 56' 53.753" N	7° 31.300114' W	56° 56.895893' N
	-7.518410244	56.94719153	7° 31' 6.276" W	56° 56' 49.889" N	7° 31.104615' W	56° 56.831492' N
	-7.514900798	56.94738443	7° 30' 53.642" W	56° 56' 50.583" N	7° 30.894048' W	56° 56.843066' N
Benbecula - South Uist	-7.337718484	57.40240606	7° 20' 15.786" W	57° 24' 8.661" N	7° 20.263109' W	57° 24.144364' N
	-7.33687091	57.40894877	7° 20' 12.735" W	57° 24' 32.215" N	7° 20.212255' W	57° 24.536926' N
	-7.332974704	57.40958722	7° 19' 58.708" W	57° 24' 34.513" N	7° 19.978482' W	57° 24.575233' N
	-7.328355829	57.40826975	7° 19' 42.080" W	57° 24' 29.771" N	7° 19.70135' W	57° 24.496185' N
	-7.325596904	57.4065028	7° 19' 32.148" W	57° 24' 23.410" N	7° 19.535814' W	57° 24.390168' N
	-7.318589996	57.40513477	7° 19' 6.923" W	57° 24' 18.485" N	7° 19.1154' W	57° 24.308086' N
	-7.316913018	57.40130191	7° 19' 0.886" W	57° 24' 4.686" N	7° 19.014781' W	57° 24.078115' N
	-7.313014546	57.40048392	7° 18' 46.852" W	57° 24' 1.742" N	7° 18.780873' W	57° 24.029035' N
	-7.323071553	57.39490681	7° 19' 23.057" W	57° 23' 41.664" N	7° 19.384293' W	57° 23.694408' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-7.326376213	57.39416528	7° 19' 34.954" W	57° 23' 38.995" N	7° 19.582573' W	57° 23.649917' N
	-7.329365993	57.39419907	7° 19' 45.717" W	57° 23' 39.116" N	7° 19.76196' W	57° 23.651944' N
	-7.330569043	57.39467518	7° 19' 50.048" W	57° 23' 40.830" N	7° 19.834143' W	57° 23.680511' N
	-7.329567927	57.39564195	7° 19' 46.444" W	57° 23' 44.311" N	7° 19.774076' W	57° 23.738517' N
	-7.327425983	57.39539842	7° 19' 38.733" W	57° 23' 43.434" N	7° 19.645559' W	57° 23.723905' N
	-7.327654029	57.39849891	7° 19' 39.554" W	57° 23' 54.596" N	7° 19.659242' W	57° 23.909934' N
Eriskay - Barra 2	-7.377786193	57.03159326	7° 22' 40.030" W	57° 1' 53.735" N	7° 22.667172' W	57° 1.895596' N
	-7.426775657	57.03559553	7° 25' 36.392" W	57° 2' 8.143" N	7° 25.606539' W	57° 2.135732' N
	-7.420513756	57.04474499	7° 25' 13.849" W	57° 2' 41.081" N	7° 25.230825' W	57° 2.684699' N
	-7.405772338	57.04388936	7° 24' 20.780" W	57° 2' 38.001" N	7° 24.34634' W	57° 2.633362' N
	-7.378023198	57.04090135	7° 22' 40.883" W	57° 2' 27.244" N	7° 22.681392' W	57° 2.454081' N
	-7.336872753	57.05169255	7° 20' 12.741" W	57° 3' 6.093" N	7° 20.212365' W	57° 3.101553' N
	-7.331790794	57.05391364	7° 19' 54.446" W	57° 3' 14.089" N	7° 19.907448' W	57° 3.234819' N
	-7.324767274	57.0666202	7° 19' 29.162" W	57° 3' 59.832" N	7° 19.486036' W	57° 3.997212' N
	-7.320071567	57.07511541	7° 19' 12.257" W	57° 4' 30.415" N	7° 19.204294' W	57° 4.506924' N
	-7.315899026	57.07884889	7° 18' 57.236" W	57° 4' 43.855" N	7° 18.953942' W	57° 4.730933' N
	-7.313415335	57.07973895	7° 18' 48.295" W	57° 4' 47.060" N	7° 18.80492' W	57° 4.784337' N
	-7.311975743	57.07927783	7° 18' 43.112" W	57° 4' 45.400" N	7° 18.718545' W	57° 4.75667' N
	-7.308234244	57.0778526	7° 18' 29.643" W	57° 4' 40.269" N	7° 18.494055' W	57° 4.671156' N
	-7.304624951	57.07249124	7° 18' 16.649" W	57° 4' 20.968" N	7° 18.277497' W	57° 4.349474' N
	-7.310693532	57.0658156	7° 18' 38.496" W	57° 3' 56.936" N	7° 18.641612' W	57° 3.948936' N
	-7.309073065	57.06116195	7° 18' 32.663" W	57° 3' 40.183" N	7° 18.544384' W	57° 3.669717' N
	-7.308103748	57.05837827	7° 18' 29.173" W	57° 3' 30.161" N	7° 18.486225' W	57° 3.502696' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-7.322156645	57.04537955	7° 19' 19.763" W	57° 2' 43.366" N	7° 19.329399' W	57° 2.722773' N
Kisimul Castle	-7.488463243	56.95451747	7° 29' 18.467" W	56° 57' 16.262" N	7° 29.307795' W	56° 57.271048' N
	-7.487266682	56.95366204	7° 29' 14.160" W	56° 57' 13.183" N	7° 29.236001' W	56° 57.219722' N
	-7.486014869	56.95432362	7° 29' 9.653" W	56° 57' 15.565" N	7° 29.160892' W	56° 57.259417' N
	-7.482953928	56.95395591	7° 28' 58.634" W	56° 57' 14.241" N	7° 28.977236' W	56° 57.237355' N
	-7.48459543	56.95062561	7° 29' 4.543" W	56° 57' 2.252" N	7° 29.075726' W	56° 57.037537' N
	-7.486826786	56.9498935	7° 29' 12.576" W	56° 56' 59.616" N	7° 29.209607' W	56° 56.99361' N
	-7.489930559	56.95019394	7° 29' 23.750" W	56° 57' 0.698" N	7° 29.395834' W	56° 57.011636' N
	-7.491790531	56.95162065	7° 29' 30.445" W	56° 57' 5.834" N	7° 29.507432' W	56° 57.097239' N
	-7.490115155	56.95526861	7° 29' 24.414" W	56° 57' 18.967" N	7° 29.406909' W	56° 57.316117' N
Laxay - Kershader 2	-6.51775908	58.09291629	6° 31' 3.932" W	58° 5' 34.498" N	6° 31.065545' W	58° 5.574977' N
	-6.518694673	58.09572989	6° 31' 7.300" W	58° 5' 44.627" N	6° 31.12168' W	58° 5.743793' N
	-6.517512793	58.09601807	6° 31' 3.046" W	58° 5' 45.665" N	6° 31.050768' W	58° 5.761084' N
	-6.519748404	58.09754515	6° 31' 11.094" W	58° 5' 51.162" N	6° 31.184904' W	58° 5.852709' N
	-6.518740118	58.09899207	6° 31' 7.464" W	58° 5' 56.371" N	6° 31.124407' W	58° 5.939524' N
	-6.514841686	58.09725704	6° 30' 53.430" W	58° 5' 50.125" N	6° 30.890501' W	58° 5.835422' N
	-6.51267026	58.09750248	6° 30' 45.612" W	58° 5' 51.008" N	6° 30.760216' W	58° 5.850149' N
	-6.508801703	58.09913564	6° 30' 31.686" W	58° 5' 56.888" N	6° 30.528102' W	58° 5.948138' N
	-6.508468376	58.099913	6° 30' 30.486" W	58° 5' 59.686" N	6° 30.508103' W	58° 5.99478' N
	-6.51115234	58.10011731	6° 30' 40.148" W	58° 6' 0.422" N	6° 30.66914' W	58° 6.007039' N
	-6.510922742	58.10127495	6° 30' 39.321" W	58° 6' 4.589" N	6° 30.655365' W	58° 6.076497' N
	-6.509371689	58.10180402	6° 30' 33.738" W	58° 6' 6.494" N	6° 30.562301' W	58° 6.108241' N
	-6.506124896	58.10162914	6° 30' 22.049" W	58° 6' 5.864" N	6° 30.367494' W	58° 6.097748' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-6.502835311	58.09935647	6° 30' 10.207" W	58° 5' 57.683" N	6° 30.170119' W	58° 5.961388' N
	-6.501058433	58.09262636	6° 30' 3.810" W	58° 5' 33.454" N	6° 30.063506' W	58° 5.557582' N
	-6.508716288	58.09380317	6° 30' 31.378" W	58° 5' 37.691" N	6° 30.522977' W	58° 5.62819' N
	-6.515759398	58.09077028	6° 30' 56.733" W	58° 5' 26.773" N	6° 30.945564' W	58° 5.446217' N
North Uist - Benbecula	-7.334084562	57.4847006	7° 20' 2.704" W	57° 29' 4.922" N	7° 20.045074' W	57° 29.082036' N
	-7.336511944	57.48557445	7° 20' 11.442" W	57° 29' 8.068" N	7° 20.190717' W	57° 29.134467' N
	-7.341365946	57.48412118	7° 20' 28.917" W	57° 29' 2.836" N	7° 20.481957' W	57° 29.047271' N
	-7.342293882	57.4992594	7° 20' 32.257" W	57° 29' 57.333" N	7° 20.537633' W	57° 29.955564' N
	-7.340051328	57.50549753	7° 20' 24.184" W	57° 30' 19.791" N	7° 20.40308' W	57° 30.329852' N
	-7.335875547	57.50893491	7° 20' 9.151" W	57° 30' 32.165" N	7° 20.152533' W	57° 30.536095' N
	-7.326082073	57.51246819	7° 19' 33.895" W	57° 30' 44.885" N	7° 19.564924' W	57° 30.748091' N
	-7.323231998	57.51096254	7° 19' 23.635" W	57° 30' 39.465" N	7° 19.39392' W	57° 30.657752' N
	-7.319114365	57.50959273	7° 19' 8.811" W	57° 30' 34.533" N	7° 19.146862' W	57° 30.575564' N
	-7.315575045	57.50998609	7° 18' 56.070" W	57° 30' 35.949" N	7° 18.934503' W	57° 30.599165' N
	-7.31403749	57.5091755	7° 18' 50.534" W	57° 30' 33.031" N	7° 18.842249' W	57° 30.55053' N
	-7.312732006	57.50848725	7° 18' 45.835" W	57° 30' 30.554" N	7° 18.76392' W	57° 30.509235' N
	-7.310883499	57.50883728	7° 18' 39.180" W	57° 30' 31.814" N	7° 18.65301' W	57° 30.530237' N
	-7.279735125	57.49339169	7° 16' 47.046" W	57° 29' 36.210" N	7° 16.784107' W	57° 29.603502' N
	-7.283651276	57.48199926	7° 17' 1.144" W	57° 28' 55.197" N	7° 17.019077' W	57° 28.919955' N
	-7.290466663	57.48478858	7° 17' 25.679" W	57° 29' 5.238" N	7° 17.428' W	57° 29.087315' N
	-7.293188425	57.48271638	7° 17' 35.478" W	57° 28' 57.778" N	7° 17.591305' W	57° 28.962983' N
	-7.295494839	57.48575028	7° 17' 43.781" W	57° 29' 8.700" N	7° 17.72969' W	57° 29.145017' N
	-7.298776236	57.48607031	7° 17' 55.594" W	57° 29' 9.853" N	7° 17.926574' W	57° 29.164219' N

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	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-7.324424955	57.48498087	7° 19' 27.929" W	57° 29' 5.931" N	7° 19.465497' W	57° 29.098852' N
North Uist - Berneray	-7.199164419	57.69707479	7° 11' 56.991" W	57° 41' 49.469" N	7° 11.949865' W	57° 41.824487' N
	-7.201567448	57.69392592	7° 12' 5.642" W	57° 41' 38.133" N	7° 12.094047' W	57° 41.635555' N
	-7.203919218	57.69617804	7° 12' 14.109" W	57° 41' 46.240" N	7° 12.235153' W	57° 41.770682' N
	-7.203612856	57.69868524	7° 12' 13.006" W	57° 41' 55.266" N	7° 12.216771' W	57° 41.921114' N
	-7.200424104	57.70227448	7° 12' 1.526" W	57° 42' 8.188" N	7° 12.025446' W	57° 42.136469' N
	-7.195754465	57.70282488	7° 11' 44.716" W	57° 42' 10.169" N	7° 11.745268' W	57° 42.169493' N
	-7.198359484	57.70456449	7° 11' 54.094" W	57° 42' 16.432" N	7° 11.901569' W	57° 42.273869' N
	-7.195425009	57.70750226	7° 11' 43.530" W	57° 42' 27.008" N	7° 11.725501' W	57° 42.450136' N
	-7.191474494	57.70890605	7° 11' 29.308" W	57° 42' 32.061" N	7° 11.48847' W	57° 42.534363' N
	-7.189391891	57.70701892	7° 11' 21.810" W	57° 42' 25.268" N	7° 11.363513' W	57° 42.421135' N
	-7.18975593	57.70545314	7° 11' 23.121" W	57° 42' 19.631" N	7° 11.385356' W	57° 42.327188' N
	-7.188349771	57.70450543	7° 11' 18.059" W	57° 42' 16.219" N	7° 11.300986' W	57° 42.270326' N
	-7.185839498	57.70487007	7° 11' 9.022" W	57° 42' 17.532" N	7° 11.15037' W	57° 42.292204' N
	-7.182763258	57.70270592	7° 10' 57.947" W	57° 42' 9.741" N	7° 10.965795' W	57° 42.162355' N
	-7.18413706	57.70147482	7° 11' 2.893" W	57° 42' 5.309" N	7° 11.048224' W	57° 42.088489' N
	-7.195041175	57.69709462	7° 11' 42.148" W	57° 41' 49.540" N	7° 11.70247' W	57° 41.825677' N
Claddach East	-7.263691504	57.51130128	7° 15' 49.289" W	57° 30' 40.684" N	7° 15.82149' W	57° 30.678077' N
	-7.261582284	57.51078258	7° 15' 41.696" W	57° 30' 38.817" N	7° 15.694937' W	57° 30.646955' N
	-7.260889329	57.51049907	7° 15' 39.201" W	57° 30' 37.796" N	7° 15.65336' W	57° 30.629944' N
	-7.260810015	57.51001204	7° 15' 38.916" W	57° 30' 36.043" N	7° 15.648601' W	57° 30.600723' N
	-7.258530226	57.50895225	7° 15' 30.708" W	57° 30' 32.228" N	7° 15.511814' W	57° 30.537135' N
	-7.257316094	57.50866647	7° 15' 26.337" W	57° 30' 31.199" N	7° 15.438966' W	57° 30.519988' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-7.2614717	57.50628705	7° 15' 41.298" W	57° 30' 22.633" N	7° 15.688302' W	57° 30.377223' N
	-7.261914155	57.50697131	7° 15' 42.890" W	57° 30' 25.096" N	7° 15.714849' W	57° 30.418279' N
	-7.264383672	57.50734688	7° 15' 51.781" W	57° 30' 26.448" N	7° 15.86302' W	57° 30.440813' N
	-7.265165686	57.50811346	7° 15' 54.596" W	57° 30' 29.208" N	7° 15.909941' W	57° 30.486808' N
	-7.26405115	57.50908668	7° 15' 50.584" W	57° 30' 32.712" N	7° 15.843069' W	57° 30.545201' N
	-7.266128777	57.51002068	7° 15' 58.063" W	57° 30' 36.074" N	7° 15.967727' W	57° 30.601241' N
Claddach West	-7.271626841	57.51349133	7° 16' 17.856" W	57° 30' 48.568" N	7° 16.29761' W	57° 30.80948' N
	-7.270388342	57.51258881	7° 16' 13.398" W	57° 30' 45.319" N	7° 16.223301' W	57° 30.755329' N
	-7.271450882	57.50892554	7° 16' 17.223" W	57° 30' 32.131" N	7° 16.287053' W	57° 30.535532' N
	-7.2762622	57.50975224	7° 16' 34.543" W	57° 30' 35.108" N	7° 16.575732' W	57° 30.585135' N
	-7.278197142	57.50909847	7° 16' 41.509" W	57° 30' 32.754" N	7° 16.691829' W	57° 30.545908' N
	-7.279576	57.50931077	7° 16' 46.473" W	57° 30' 33.518" N	7° 16.77456' W	57° 30.558646' N
	-7.278236313	57.51347625	7° 16' 41.650" W	57° 30' 48.514" N	7° 16.694179' W	57° 30.808575' N
	-7.275858565	57.51286514	7° 16' 33.090" W	57° 30' 46.314" N	7° 16.551514' W	57° 30.771908' N
Claddach Centre	-7.266461367	57.5079544	7° 15' 59.260" W	57° 30' 28.635" N	7° 15.987682' W	57° 30.477264' N
	-7.265528591	57.50813426	7° 15' 55.902" W	57° 30' 29.283" N	7° 15.931715' W	57° 30.488055' N
	-7.265259224	57.50789482	7° 15' 54.933" W	57° 30' 28.421" N	7° 15.915553' W	57° 30.473689' N
	-7.265319083	57.50775265	7° 15' 55.148" W	57° 30' 27.909" N	7° 15.919145' W	57° 30.465159' N
	-7.26496741	57.50745336	7° 15' 53.882" W	57° 30' 26.832" N	7° 15.898045' W	57° 30.447201' N
	-7.26501184	57.50710792	7° 15' 54.042" W	57° 30' 25.588" N	7° 15.90071' W	57° 30.426475' N
	-7.26513149	57.50703927	7° 15' 54.473" W	57° 30' 25.341" N	7° 15.907889' W	57° 30.422356' N
	-7.265480632	57.50701573	7° 15' 55.730" W	57° 30' 25.256" N	7° 15.928838' W	57° 30.420944' N
	-7.265753058	57.50710988	7° 15' 56.711" W	57° 30' 25.595" N	7° 15.945183' W	57° 30.426593' N

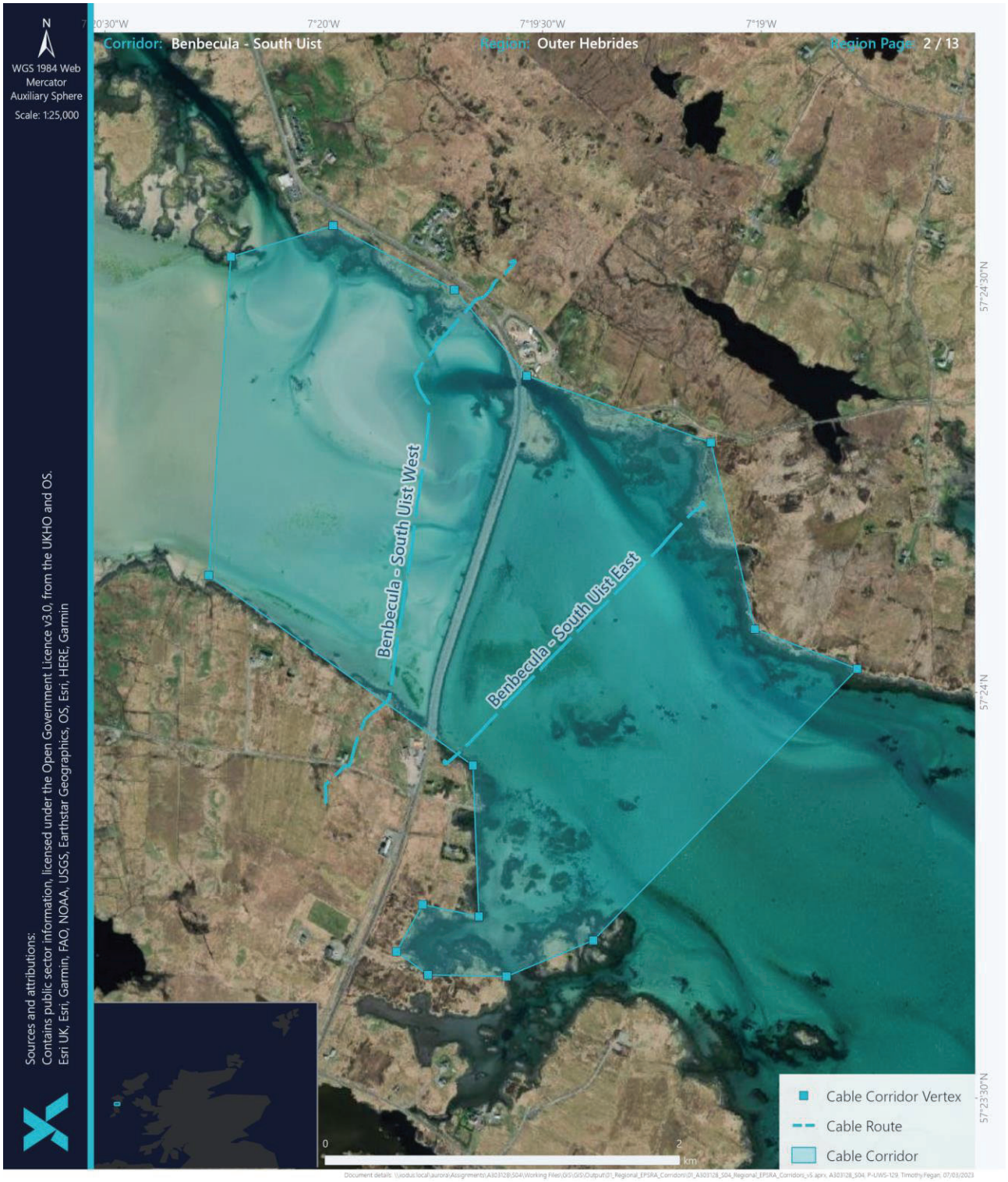
Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
South Uist - Eriskay	-7.32625872	57.10318907	7° 19' 34.531" W	57° 6' 11.480" N	7° 19.575523' W	57° 6.191344' N
	-7.317690248	57.09692377	7° 19' 3.684" W	57° 5' 48.925" N	7° 19.061415' W	57° 5.815426' N
	-7.31710207	57.09395533	7° 19' 1.567" W	57° 5' 38.239" N	7° 19.026124' W	57° 5.63732' N
	-7.311760551	57.08958814	7° 18' 42.337" W	57° 5' 22.517" N	7° 18.705633' W	57° 5.375289' N
	-7.312316478	57.08843706	7° 18' 44.339" W	57° 5' 18.373" N	7° 18.738989' W	57° 5.306224' N
	-7.314102547	57.08795618	7° 18' 50.769" W	57° 5' 16.642" N	7° 18.846153' W	57° 5.277371' N
	-7.311107781	57.0857781	7° 18' 39.988" W	57° 5' 8.801" N	7° 18.666467' W	57° 5.146686' N
	-7.310716953	57.08287317	7° 18' 38.581" W	57° 4' 58.343" N	7° 18.643017' W	57° 4.97239' N
	-7.312002169	57.08117794	7° 18' 43.207" W	57° 4' 52.240" N	7° 18.72013' W	57° 4.870677' N
	-7.316101535	57.0815547	7° 18' 57.965" W	57° 4' 53.596" N	7° 18.966092' W	57° 4.893282' N
	-7.319270811	57.08289464	7° 19' 9.374" W	57° 4' 58.420" N	7° 19.156249' W	57° 4.973679' N
	-7.343126589	57.10047574	7° 20' 35.255" W	57° 6' 1.712" N	7° 20.587595' W	57° 6.028545' N
	-7.344591585	57.10313919	7° 20' 40.529" W	57° 6' 11.301" N	7° 20.675495' W	57° 6.188352' N
	-7.340155604	57.10156874	7° 20' 24.560" W	57° 6' 5.647" N	7° 20.409336' W	57° 6.094125' N
	-7.335576353	57.10302486	7° 20' 8.074" W	57° 6' 10.889" N	7° 20.134581' W	57° 6.181491' N
South Uist - Barra	-7.444585325	57.05823688	7° 26' 40.507" W	57° 3' 29.652" N	7° 26.675119' W	57° 3.494213' N
	-7.428799866	57.06491642	7° 25' 43.679" W	57° 3' 53.699" N	7° 25.727992' W	57° 3.894985' N
	-7.400648621	57.09393593	7° 24' 2.335" W	57° 5' 38.169" N	7° 24.038917' W	57° 5.636156' N
	-7.385924977	57.10318521	7° 23' 9.329" W	57° 6' 11.466" N	7° 23.155499' W	57° 6.191113' N
	-7.374882652	57.10602838	7° 22' 29.577" W	57° 6' 21.702" N	7° 22.492959' W	57° 6.361703' N
	-7.356514818	57.10367561	7° 21' 23.453" W	57° 6' 13.232" N	7° 21.390889' W	57° 6.220537' N
	-7.381301867	57.08787193	7° 22' 52.686" W	57° 5' 16.338" N	7° 22.878112' W	57° 5.272316' N
	-7.402709839	57.06485132	7° 24' 9.755" W	57° 3' 53.464" N	7° 24.16259' W	57° 3.891079' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-7.431149234	57.05249096	7° 25' 52.137" W	57° 3' 8.967" N	7° 25.868954' W	57° 3.149458' N
	-7.44531857	57.04994095	7° 26' 43.146" W	57° 2' 59.787" N	7° 26.719114' W	57° 2.996457' N
North Uist to Harris	-7.110625	57.595509	7° 6' 38.250" W	57° 35' 43.832" N	7° 6.637501' W	57° 35.730543' N
	-7.155512	57.585166	7° 9' 19.844" W	57° 35' 6.598" N	7° 9.330742' W	57° 35.10997' N
	-7.188337	57.592989	7° 11' 18.013" W	57° 35' 34.760" N	7° 11.300227' W	57° 35.579343' N
	-7.18088	57.601647	7° 10' 51.169" W	57° 36' 5.929" N	7° 10.85282' W	57° 36.098824' N
	-7.148245	57.617803	7° 8' 53.681" W	57° 37' 4.091" N	7° 8.894696' W	57° 37.068193' N
	-7.100636	57.610159	7° 6' 2.288" W	57° 36' 36.573" N	7° 6.038136' W	57° 36.60955' N
	-7.065007	57.641252	7° 3' 54.026" W	57° 38' 28.508" N	7° 3.900436' W	57° 38.475143' N
	-7.046534	57.651919	7° 2' 47.523" W	57° 39' 6.909" N	7° 2.792052' W	57° 39.11515' N
	-7.01977	57.692285	7° 1' 11.173" W	57° 41' 32.226" N	7° 1.186222' W	57° 41.537112' N
	-7.001812	57.707707	7° 0' 6.523" W	57° 42' 27.745" N	7° 0.108717' W	57° 42.46243' N
	-7.020825	57.726492	7° 1' 14.969" W	57° 43' 35.371" N	7° 1.249498' W	57° 43.58953' N
	-7.009326	57.756648	7° 0' 33.573" W	57° 45' 23.931" N	7° 0.559563' W	57° 45.398866' N
	-6.987153	57.744182	6° 59' 13.749" W	57° 44' 39.053" N	6° 59.229156' W	57° 44.650891' N
	-6.972919	57.730253	6° 58' 22.508" W	57° 43' 48.910" N	6° 58.375142' W	57° 43.815178' N
	-6.968294	57.729447	6° 58' 5.857" W	57° 43' 46.009" N	6° 58.097632' W	57° 43.76682' N
	-6.981027	57.744423	6° 58' 51.698" W	57° 44' 39.923" N	6° 58.861647' W	57° 44.665385' N
	-6.968257	57.742621	6° 58' 5.726" W	57° 44' 33.434" N	6° 58.095446' W	57° 44.557237' N
	-6.954751	57.738388	6° 57' 17.103" W	57° 44' 18.195" N	6° 57.285059' W	57° 44.303264' N
	-6.938311	57.759592	6° 56' 17.919" W	57° 45' 34.531" N	6° 56.298656' W	57° 45.575527' N
	-6.90719	57.763776	6° 54' 25.883" W	57° 45' 49.593" N	6° 54.43139' W	57° 45.826567' N
	-6.929311	57.778935	6° 55' 45.521" W	57° 46' 44.166" N	6° 55.758688' W	57° 46.736105' N

Corridor Name	Co-ordinates for EPS licence application form and JNCC noise registry		Co-ordinates for the survey works (WGS84) (the DMS are not negative due to these being westerlies i.e. west of Greenwich meantime)		Co-ordinates for the survey works, (WGS84) (the DDM are not negative due to these being westerlies i.e. west of Greenwich meantime)	
	Longitude DD	Latitude DD	Longitude DMS	Latitude DMS	Longitude DDM	Latitude DDM
	-6.911267	57.784692	6° 54' 40.562" W	57° 47' 4.892" N	6° 54.676035' W	57° 47.081548' N
	-6.875827	57.774868	6° 52' 32.975" W	57° 46' 29.524" N	6° 52.549599' W	57° 46.492083' N
	-6.888387	57.794799	6° 53' 18.194" W	57° 47' 41.275" N	6° 53.303245' W	57° 47.687933' N
	-6.874415	57.799072	6° 52' 27.894" W	57° 47' 56.657" N	6° 52.464913' W	57° 47.9443' N
	-6.8632	57.79094	6° 51' 47.521" W	57° 47' 27.384" N	6° 51.792027' W	57° 47.456414' N
	-6.866764	57.815083	6° 52' 0.349" W	57° 48' 54.298" N	6° 52.005833' W	57° 48.904972' N
	-6.850263	57.815474	6° 51' 0.945" W	57° 48' 55.707" N	6° 51.015757' W	57° 48.928459' N
	-6.847376	57.804719	6° 50' 50.554" W	57° 48' 16.987" N	6° 50.842583' W	57° 48.283124' N
	-6.773926	57.7725	6° 46' 26.132" W	57° 46' 20.999" N	6° 46.43554' W	57° 46.349985' N
	-6.963357	57.590235	6° 57' 48.084" W	57° 35' 24.847" N	6° 57.801409' W	57° 35.414129' N
	-7.097147	57.586926	7° 5' 49.727" W	57° 35' 12.934" N	7° 5.828795' W	57° 35.215574' N

.

APPENDIX B INDIVIDUAL CORRIDOR/ CABLE MAPS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WGS 1984 Web Mercator Auxiliary Sphere
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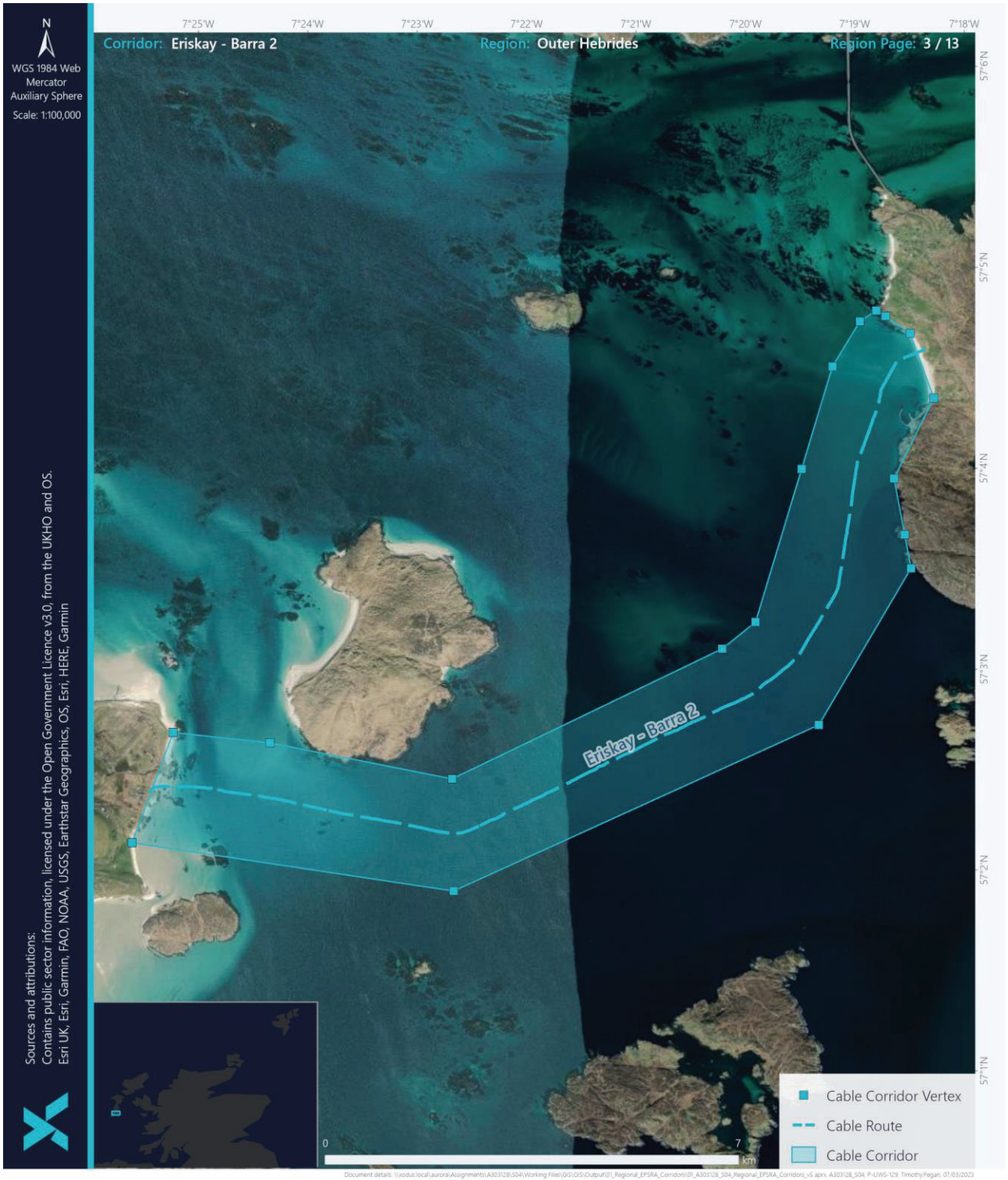
7°20'30"W
7°20'W
7°19'30"W
7°19'W
Corridor: Benbecula - South Uist
Region: Outer Hebrides
Region Page: 2 / 13
57°24'30"N
57°24'N
57°23'30"N
Benbecula - South Uist West
Benbecula - South Uist East
0
2
km
Cable Corridor Vertex
Cable Route
Cable Corridor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WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:100,000
Corridor: Eriskay - Barra 2
Region: Outer Hebrides
Region Page: 3 / 13
7°25'W
7°24'W
7°23'W
7°22'W
7°21'W
7°20'W
7°19'W
7°18'W
57°6'N
57°5'N
57°4'N
57°3'N
57°2'N
57°1'N
Eriskay - Barra 2
Cable Corridor Vertex
Cable Route
Cable Corridor
0
7
km
Sources and attributions:
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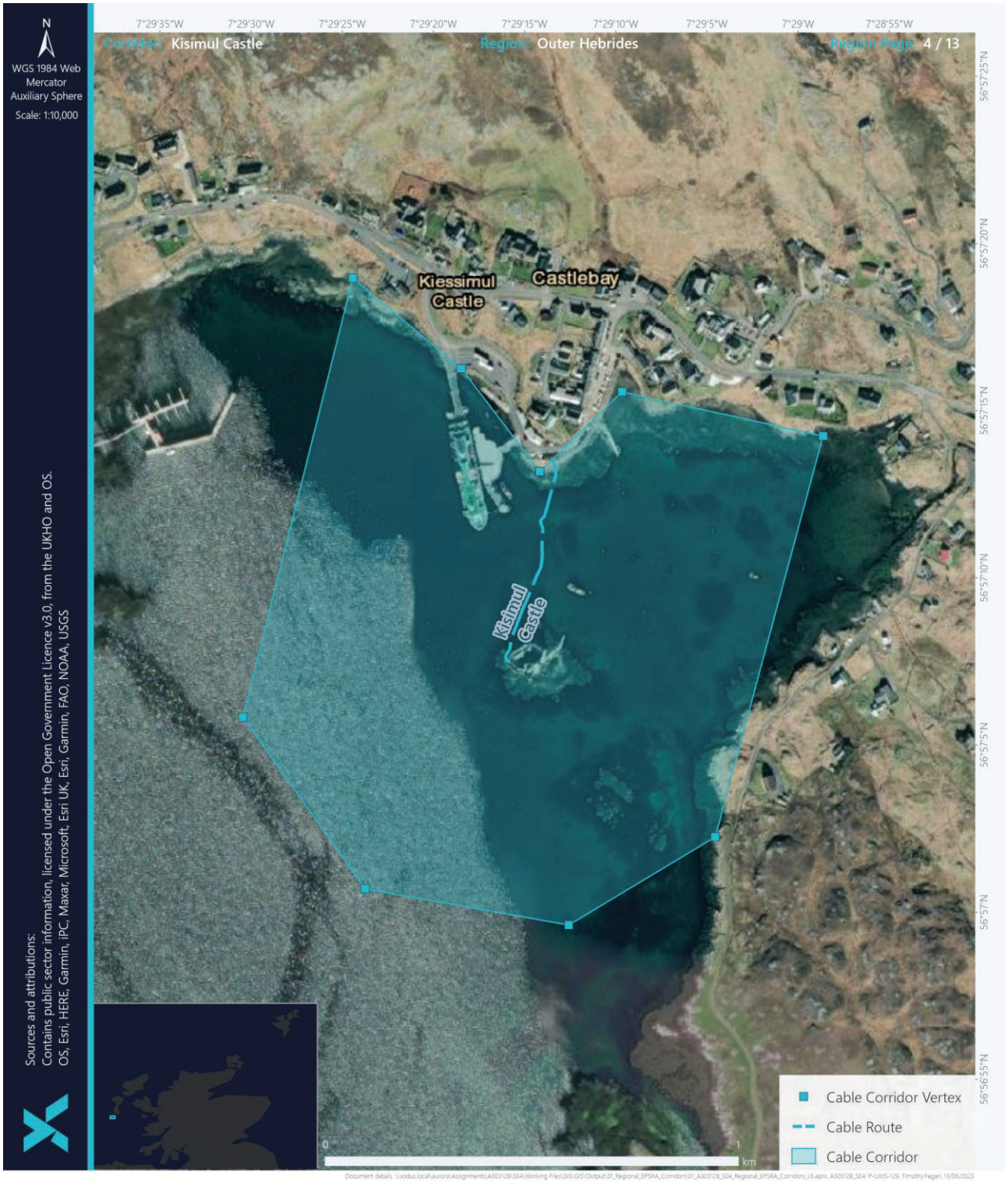
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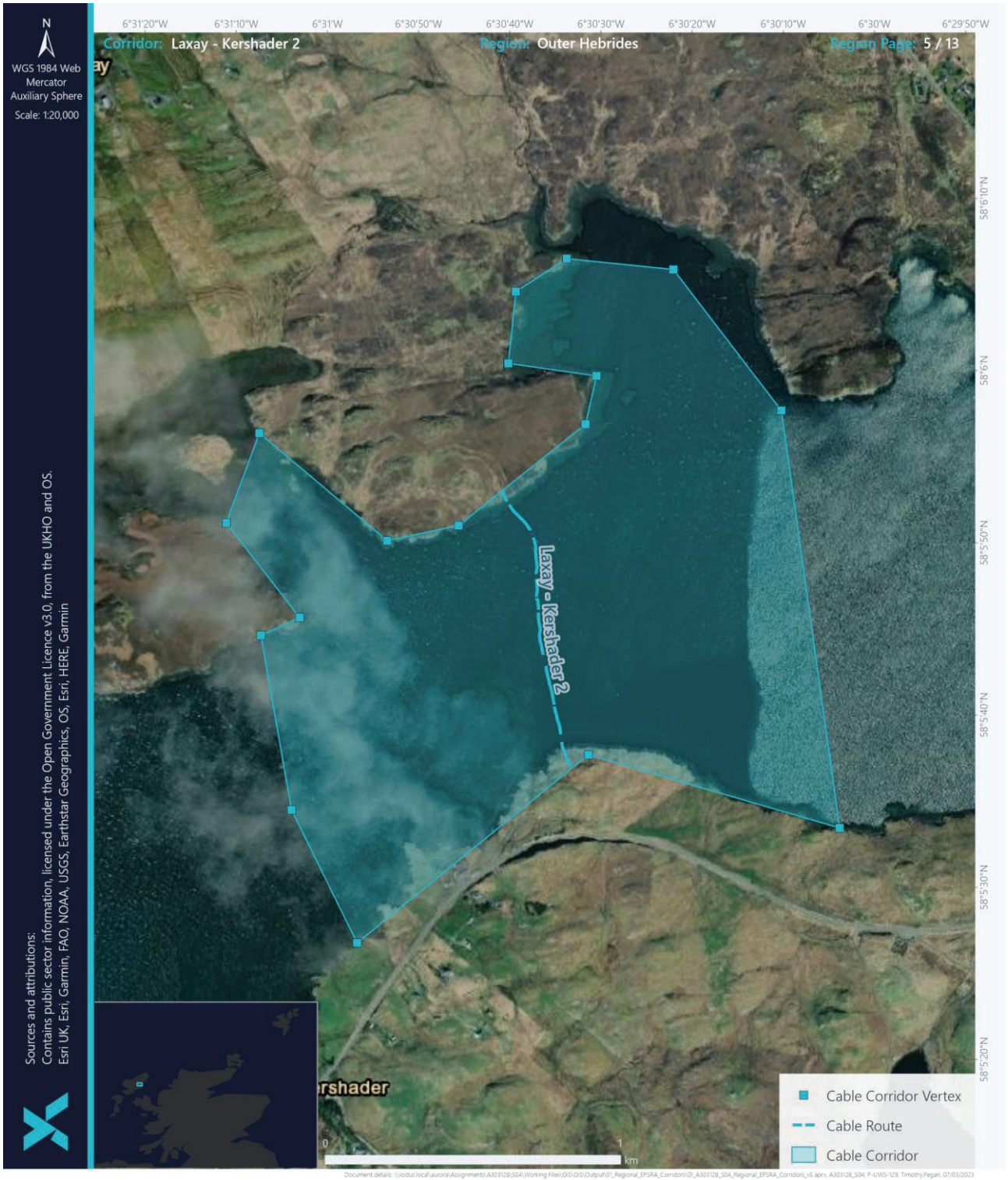
OS, Esri, HERE, Garmin, iPC, Maxar, Microsoft, Esri UK, Esri, Garmin, FAO, NOAA, USGS
7°29'35"W
7°29'30"W
7°29'25"W
7°29'20"W
7°29'15"W
7°29'10"W
7°29'5"W
7°29'W
7°28'55"W
Corridor: Kisimul Castle
Region: Outer Hebrides
Region Page: 4 / 13
56°57'25"N
56°57'20"N
56°57'15"N
56°57'10"N
56°57'5"N
56°57'N
56°56'55"N
Kiessimul Castle
Castlebay
Kisimul Castle
0
1
km
Cable Corridor Vertex
Cable Route
Cable Corridor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6°31'20"W
6°31'10"W
6°31'W
6°30'50"W
6°30'40"W
6°30'30"W
6°30'20"W
6°30'10"W
6°30'W
6°29'50"W
Corridor: Laxay - Kershader 2
Region: Outer Hebrides
Region Page: 5 / 13
58°6'10"N
58°6'N
58°5'50"N
58°5'40"N
58°5'30"N
58°5'20"N
Laxay - Kershader 2
Cable Corridor Vertex
Cable Route
Cable Corridor
0
1
km


N
WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:60,000
Corridor: North Uist - Benbecula
Region: Outer Hebrides
Region Page: 6 / 13
7°21'W
7°20'30"W
7°20'W
7°19'30"W
7°19'W
7°18'30"W
7°18'W
7°17'30"W
7°17'W
7°16'30"W
57°31'30"N
57°31'N
57°30'30"N
57°30'N
57°29'30"N
57°29'N
57°28'30"N
North Uist - Benbecula West
North Uist - Benbecula Centre
North Uist - Benbecula East
Cable Corridor Vertex
Cable Route
Cable Corridor
0
4
km
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N
WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:25,000
7°12'30"W
7°12'W
7°11'30"W
7°11'W
Corridor: North Uist - Berneray
Region: Outer Hebrides
Region Page: 7 / 13
57°42'30"N
57°42'N
57°41'30"N
North Uist - Berneray
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0
2
km
Cable Corridor Vertex
Cable Route
Cable Corridor


N
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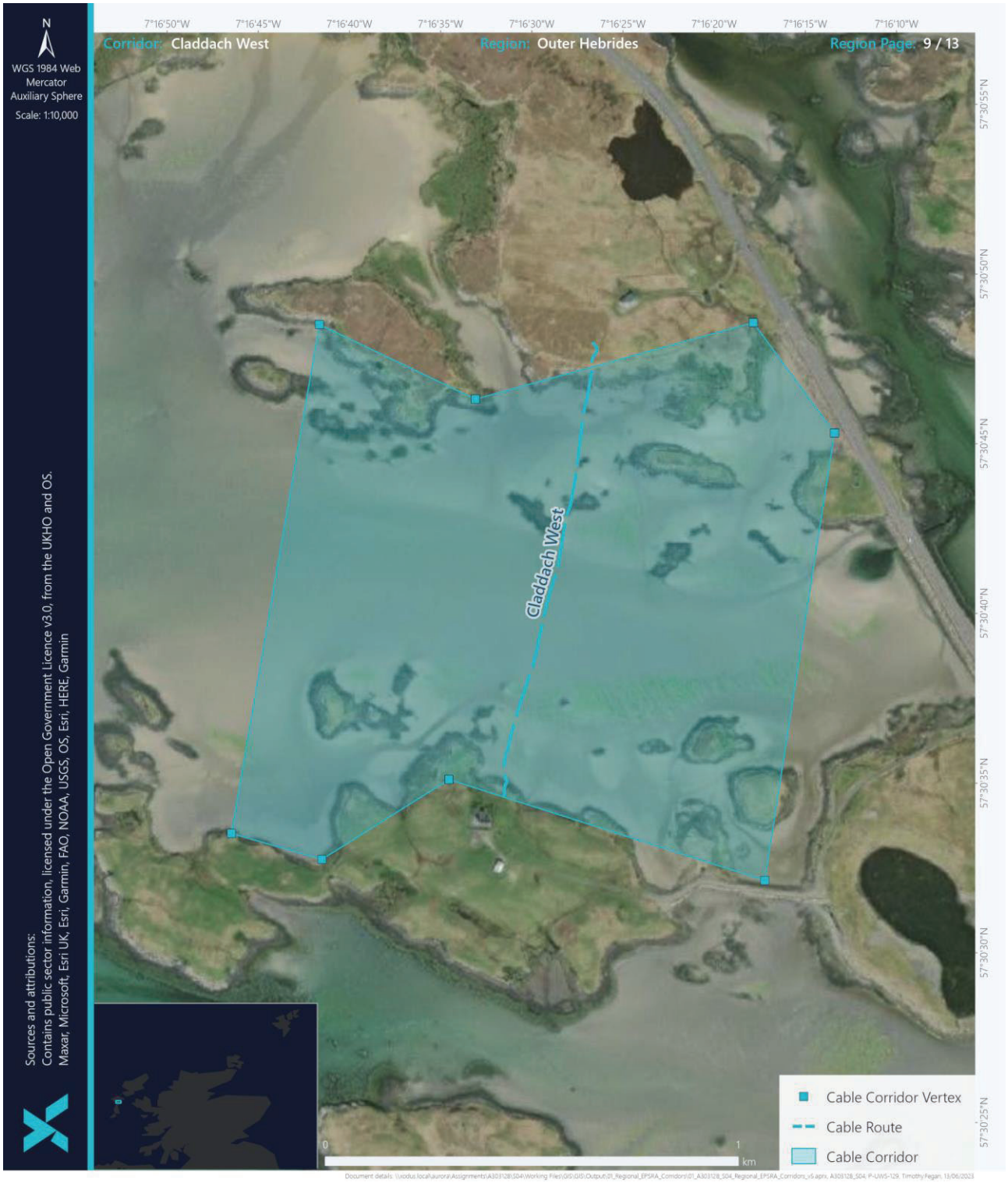
7°16'5"W
7°16'W
7°15'55"W
7°15'50"W
7°15'45"W
7°15'40"W
7°15'35"W
7°15'30"W
7°15'25"W
7°15'20"W
Corridor: Claddach East
Region: Outer Hebrides
Region Page: 8 / 13
57°30'45"N
57°30'40"N
57°30'35"N
57°30'30"N
57°30'25"N
57°30'20"N
57°30'15"N
Claddach East
0
1
km
Cable Corridor Vertex
Cable Route
Cable Corridor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Scale: 1:10,000
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Maxar, Microsoft, Esri UK, Esri, Garmin, FAO, NOAA, USGS, OS, Esri, HERE, Garmin
7°16'50"W
7°16'45"W
7°16'40"W
7°16'35"W
7°16'30"W
7°16'25"W
7°16'20"W
7°16'15"W
7°16'10"W
57°30'55"N
57°30'50"N
57°30'45"N
57°30'40"N
57°30'35"N
57°30'30"N
57°30'25"N
Corridor: Claddach West
Region: Outer Hebrides
Region Page: 9 / 13
Claddach West
0
1
km
Cable Corridor Vertex
Cable Route
Cable Corridor


N
WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:2,000
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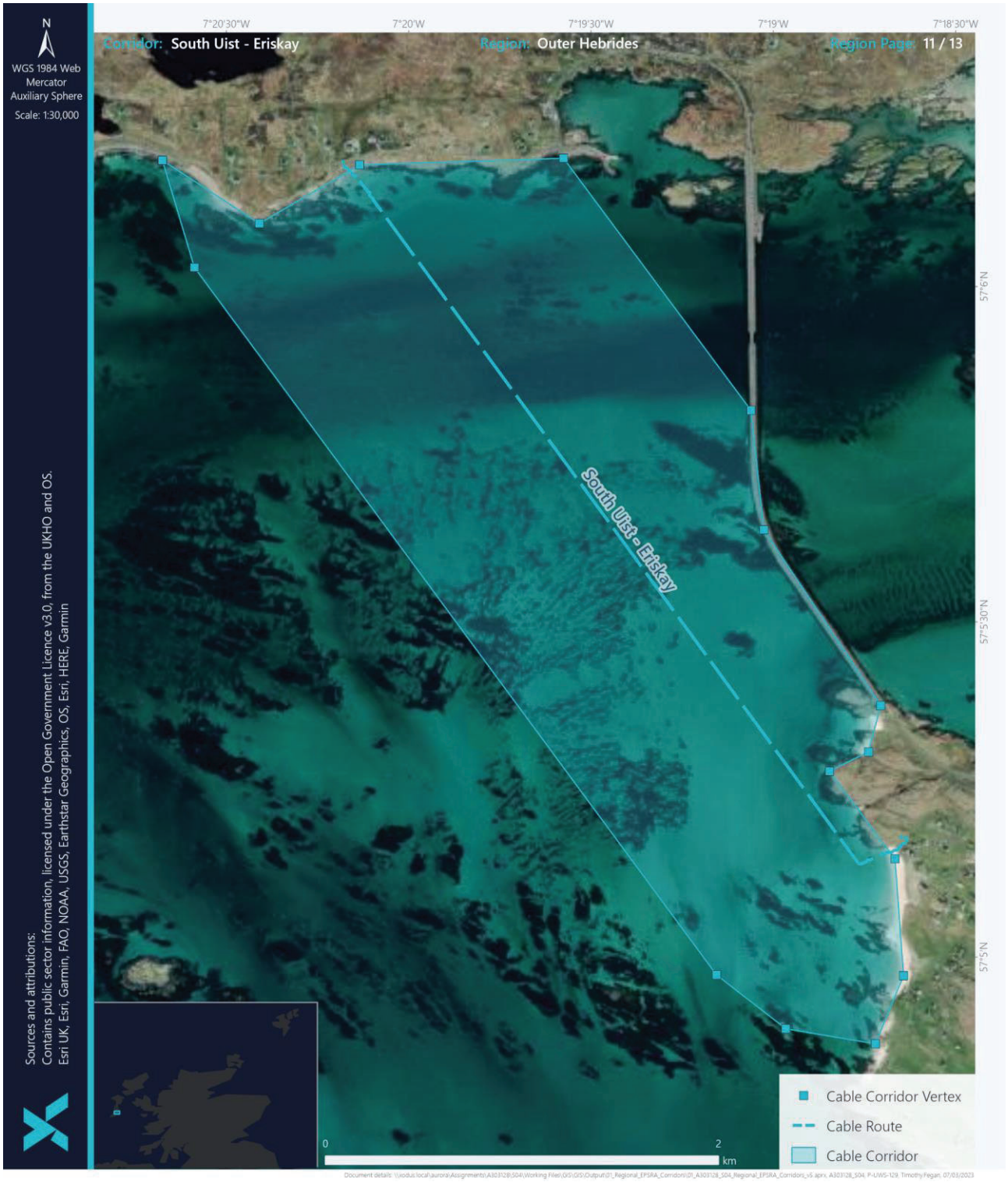
7°16'1"W
7°16'W
7°15'59"W
7°15'58"W
7°15'57"W
7°15'56"W
7°15'55"W
7°15'54"W
7°15'53"W
7°15'52"W
Corridor: Claddach Centre
Region: Outer Hebrides
Region Page: 10 / 13
57°30'30"N
57°30'29"N
57°30'28"N
57°30'27"N
57°30'26"N
57°30'25"N
57°30'24"N
Claddach Centre
0
0
km
Cable Corridor Vertex
Cable Route
Cable Corridor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WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:30,000
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7°20'30"W
7°20'W
7°19'30"W
7°19'W
7°18'30"W
Corridor: South Uist - Eriskay
Region: Outer Hebrides
Region Page: 11 / 13
57°6'N
57°5'30"N
57°5'N
South Uist - Eriskay
0
2
km
Cable Corridor Vertex
Cable Route
Cable Corridor


N
WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:90,000
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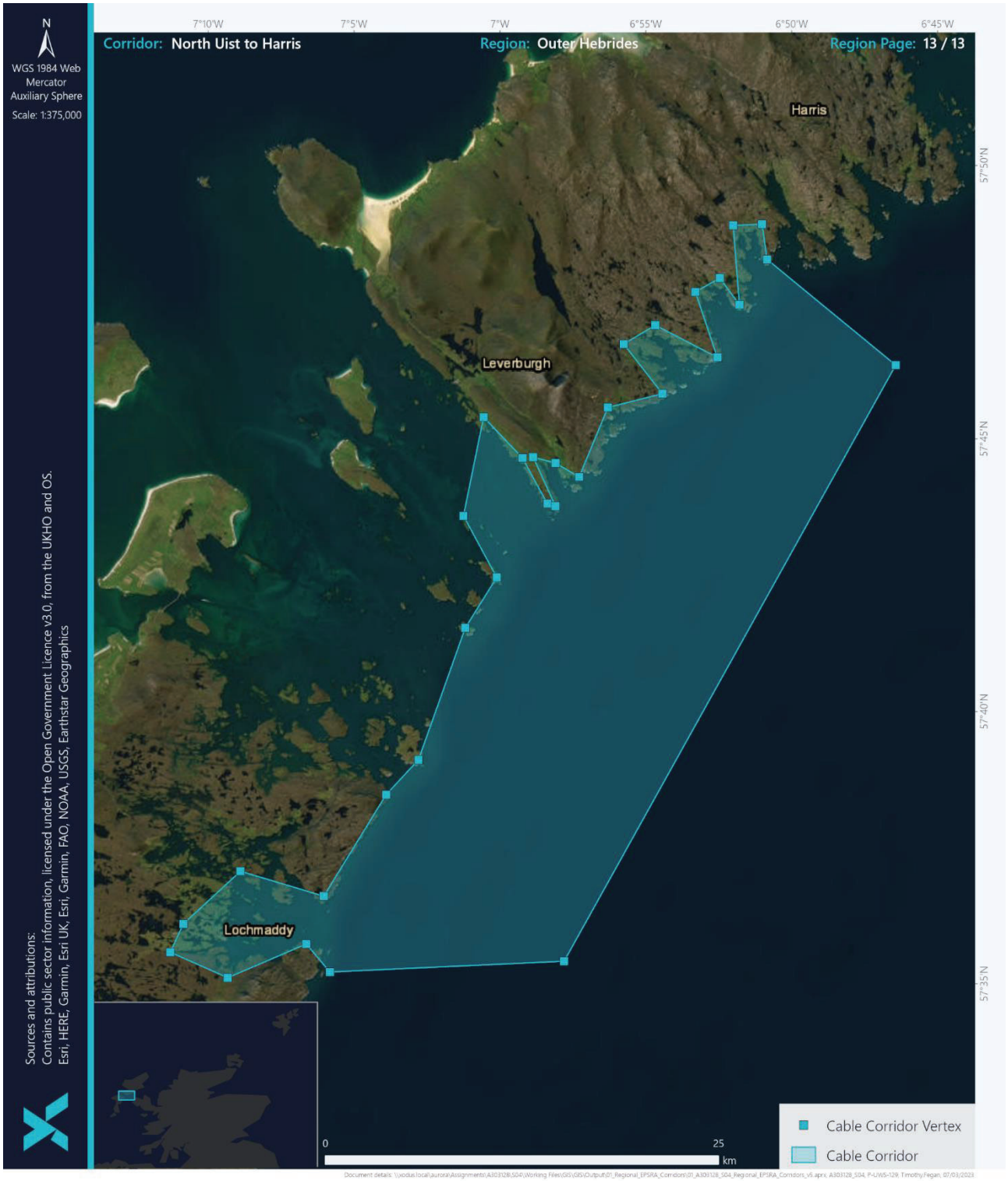
7°27'W
7°26'W
7°25'W
7°24'W
7°23'W
7°22'W
7°21'W
57°7'N
57°6'N
57°5'N
57°4'N
57°3'N
Corridor: South Uist - Barra
Region: Outer Hebrides
Region Page: 12 / 12
0
6
km
Cable Corridor Vertex
Cable Corridor


N
WGS 1984 Web Mercator Auxiliary Sphere
Scale: 1:375,000
7°10'W
7°5'W
7°W
6°55'W
6°50'W
6°45'W
Corridor: North Uist to Harris
Region: Outer Hebrides
Region Page: 13 / 13
Harris
Leverburgh
Lochmaddy
57°50'N
57°45'N
57°40'N
57°35'N
0
25
km
Cable Corridor Vertex
Cable Corridor
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